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## Machinery and Steel Plant Labor

Extent to Which Brawn Has Given Way  
to Brains — A Factor with Present  
Labor Shortage and in Safe Operations

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EVERYWHERE, on all sides, the advent of new machinery is making different demands upon labor. What have been the effects of this industrial evolution? Does the newer kind of work call for a higher or a lower type of employee as measured by physical and mental requirements? For instance, does a charging machine for the open-hearth furnaces demand higher or lower standards of its operator than were required of the men who put in the iron by hand?

As a step in the direction of finding what really has happened to the workers due to machinery's being introduced, a study has been made of the blast furnace and open-hearth departments of the iron and steel industry. Twenty-five blast furnaces and 38 open-hearth furnaces located at 17 different iron and steel plants were taken into consideration. Observation was made of the mechanical inventions introduced from time to time, and the corresponding changes in labor such inventions demanded. Four definite factors were considered throughout the investigation:

1. The nature of the mechanical processes introduced.
2. The number of employees added or displaced by the new invention.
3. The machine as regards the problem of safety.
4. The higher or lower type of worker demanded as measured by (a) physical requirements, (b) mental control and intellectual skill, (c) incomes received.

The investigation showed that: (1) In both industries mechanical methods have come in to an almost amazing extent; (2) they call for fewer workers; (3) where modern machinery has been put in the work has proved safer to the employees; (4) to a great extent unskilled labor has been displaced, and a call for higher types of workers has been made.

### Labor at the Blast Furnace

All the occupations around a blast furnace may be conveniently classified in three large groups: (1) Those centered in conveying the raw material from the stock-bins or railway cars into the furnace; (2) those which have to do with the actual operation of the furnace; (3) those concerned with handling the iron after it has left the furnace.

#### Stocking the Furnace

Stocking covers the conveying of the ore from cars and ore-bins to the furnace bell, and comprises the work of unloaders, barrowmen, or bottom-fillers, larrymen, top-fillers, cagers, weighers and sweepers.

Up to about 1895, 16 to 20 unloaders were connected with every blast furnace. Unloaders at Steelton, Pa., in 1890-94 received 12 cents per hour, and each gang had a foreman receiving 15 cents per hour. The entire labor force, including foremen, were negroes or foreigners. At furnaces where unloading is still done by hand the wages are at present 20 cents per hour.

In the more modern furnaces the raw materials are now handled by car-dumpers, requiring but one man, who has general charge of the stock. At most furnaces the stock man is an American of moderate intelligence, and of a higher type than was employed in the earlier days and earlier methods. One or two men per furnace, who show a higher degree of intellectual power, are now doing the work formerly carried on by 12 to 20 unskilled laborers.

From 1851 until 1895, bottom-fillers loaded large two-wheel barrows by hand from the various stock piles of ore, limestone and coke, moving them when loaded to the scales to be weighed, and then placing them on an elevator to go to the furnace top. A 150 to 250-ton furnace required 12 to 14 bottom-fillers per turn. The wage was the common, ordinary labor wage.

The same work at improved furnaces is now carried on by two men who load sufficient stock to make 250 to 300 tons per turn. The three mechanical inventions ushering in this change are: (1) The skip-hoist, replacing the elevator and top-fillers; (2) the larry-car, replacing the barrowmen; (3) the automatic weigher, replacing the weighman. The skip-hoist also eliminates two or three top-fillers.

As regards the operators with the old bottom-fillers, "no brains were required, only a big body with lots of endurance," while the larrymen today must be about as skillful as a trolley car motorman. Larrymen at several of the newer furnaces receive from 25 to 30 cents per hour. At most of the furnaces a larry helper is employed, who ranks as a common day laborer.

Where the skip-hoist has not yet displaced the elevator, top-fillers work at the top of the furnace. They are common, unskilled laborers, and receive ordinary laboring wages. Their work demands tremendous physical endurance, but calls for no training or skill. Usually 4 to 6 top-fillers are needed for the daily operation. With the use of the skip-hoist no top-fillers are needed.

An accompanying table taken from an older furnace and from one of the modern type shows

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from a cost basis the changing conditions. The older furnace costs are those for Nov. 6, 1916, and of the modern furnace for Oct. 28, 1916. Both furnaces are typical.

Comparative Labor Costs in Conveying Stock in Old Type and Modern Blast Furnaces

	Old Type Furnace		Modern Furnace	
	Num-ber of Men	Wage, Rate, Cents Per Hour	Num-ber of Men	Wage, Rate, Cents Per Hour
Top-fillers .....	6	23	0	0
Weighers .....	2	22 1/2	0	0
Bottom-fillers .....	18	21	0	0
Barrowmen .....	16	20 1/2	0	0
Sweepers .....	2	20	2	20
Larrymen .....	0	0	2	26 1/2
Larry helper .....	0	0	2	21
Unloaders .....	6	25	2	25
Stock foremen.....	1	24	2	24
Total men .....	51		10	
Average wage rate ..		22.3		23.3
Total labor cost per turn .....		\$132.36		\$33.72

#### Actual Furnace Operation

In blast-furnace operation we can distinguish as a class those men who handle the molten metal. These workers comprise one blower or foreman, one furnace keeper, four keeper's helpers, one monkey boss, two slagmen or cinder snappers, and one craneman.

helpers were on a tonnage basis, and in conjunction with the pig-bed men received 12 cents per ton for all pig iron cast. Including the pig-men, there were ten men per turn. If the daily tonnage was 500 tons, it would mean \$3 a turn for each worker.

An invention of no small benefit to the helpers is the patent skimmer. This saves one helper and lessens materially the danger in the casting process.

The monkey-boss has complete charge of the slag. Under his direction are usually two cinder-snappers, who break up the slag which happens to remain and become cold in the channelways. No marked changes due to the entrance of machinery were to be noted in the work connected with the handling of slag.

In summing up the occupations connected with the handling of molten metal we find that machinery has made the work much safer and also less fatiguing. Inventions have done away with two or three helpers, but have done little for work which calls for any increase of skill or ability.

#### Work After Iron Leaves the Furnace

Group 3 covers the occupations of pig-bed men, pig-casting machine men, hot-stove operatives and power-house men. In this group mechanical prog-

Comparative Labor Costs for 24-Hr. Operation in Two Shifts  
Old Type Blast Furnace, Nov. 6, 1916—Output 303 Tons  
Modern Blast Furnace, Oct. 28, 1916—Output 409 Tons

Job	Old Type Blast Furnace, Nov. 6, 1916—Output 303 Tons				Modern Blast Furnace, Oct. 28, 1916—Output 409 Tons			
	Number of Workers	Hours	Rate	Amount	Number of Workers	Hours	Rate	Amount
Top-fillers .....	6	72	23	\$16.56	(None)			
Weighers .....	2	24	22 1/2	5.40	(None)			
Bottom fillers .....	18	216	21	45.36	(None)			
Barrowmen .....	16	192	20 1/2	39.36	(None)			
Sweepers .....	2	24	20	4.80	(None)			
Larrymen .....	0	0			2	24	21	\$5.04
Larry helpers .....	0	0			2	24	26 1/2	6.56
Scrap loaders .....	4	48	20	9.60	2	24	21	5.04
Stockhouse foremen .....	1	12	24	2.88	3	36	21	7.56
Car unloaders .....	6	72	25	18.00	2	48	22	10.56
Furnace keepers .....	2	24	24 1/2	5.88	2	24	23	5.52
Helpers, first .....	2	24	22	5.28	2	24	26	6.24
Helpers, second .....	4	48	21	10.48	2	24	23	5.52
Cinder snapper .....	2	24	21	5.04	4	48	20	9.60
Clay-mixer .....	1	10	20	2.00	2	24	21	5.04
Hot oven tender .....	2	24	21 1/2	5.16	2	24	21	5.04
Hot oven labor .....	1	10	20 1/2	2.05	2	24	21	5.04
Flue dust wheeler .....	1	10	20	2.00	2	24	21	5.04
Engineers .....	2	24	25	6.24	2	24	20 1/2	6.84
Oilers .....	2	24	21	5.04	2	24	22	5.28
Machinists .....	1	11	32	3.52	1	10	35	3.50
Machinists' helper .....	1	11	23	2.53	1	10	26	2.60
Piggery foremen .....	0	0			2	24	30	7.20
Moulder .....	0	0			2	24	32	7.68
Piggery clay mixer .....	0	0			4	48	23	11.04
Flow regulator (flowman) .....	0	0			2	24	22	5.28
Piggery labor .....	0	0			4	48	21	10.08
Totals .....	76	904		\$197.18	51	622		\$146.88
Average .....				\$0.2242				\$0.2396
Casting (approximate) .....	12			36.00				
	88			\$233.18				

The prime duties of a blower are those of foreman. The position requires high skill and ability to quickly arrange activities in times of emergency. The income of these men ranges from \$90 to \$100 per month. With the growth of mechanical appliances more difficult tasks fall upon the blower, but no distinct change in type is observed.

The keeper has charge of getting the iron from the furnace, of making the sand-runners leading to the sand molds, and of opening and closing the tap-hole. The opening of the tap-hole is a prolonged, hot, and laborious job. The invention of the oxygen drill removes to a great extent the great amount of physical effort sometimes necessary to open the tap-hole. Worse, however, than opening the tap-hole was its closing, until the advent of the mud-gun in 1895. This invention removed two men and greatly eased the work of the keeper.

In most of the furnaces investigated the keeper's helpers were common laborers and received laborers' wages. At some of the furnaces all the

ress has wrought many changes in the jobs and the workers needed to fill them. Of the 25 blast furnaces studied, 10 had pig-casting machines, called piggeries, 11 used pig beds, while 4 delivered the molten iron directly to the open-hearth furnaces. The men working on pig beds rank with the keeper's helpers. The number of pig-men differs with the capacity of the furnace, usually from 6 to 15 are employed. The work calls for great physical strength and endurance, but no mental ability. Wage rates range from 18 cents to 21 cents per hour. In some instances a flat rate of 12 cents a ton is paid to the pig-bed force for every ton of iron cast. If 20 pig-bed men cast 500 tons, they would receive \$3 each. All the workers on pig beds are young or middle-aged.

Pig-casting machines drive out pig beds and pig men, and demand a new type of worker. The piggery has eliminated brute force and unskilled labor. In lieu of 24 to 60 unskilled pig-bed men for operating four furnaces, one piggery with 7

workers easily handles the iron of the same furnaces.

The labor force of the piggery at a Lebanon, Pa., furnace consisted of one hot-pot dumper, one flow regulator, one molder, two clay-mixers, two laborers and one foreman. The foreman and molder are skilled workers, the flow-regulator and clay-mixers are semi-skilled, while the ladle-dumper and the laborers are practically unskilled. Their wages average: foreman, 30 cents per hour; clay-mixers, 24 cents; flow-regulator, 23 cents; laborers, 20 cents. Comparative labor costs show, under pig-bed operation, a charge of \$48 for a 400-ton cast. The pig-casting machine to cast the above 400 tons of iron would cost per day \$33.60.

In this group are included an engineer, an oiler, a machinist, a machinist helper, a stove keeper, and a stove laborer. The machinist and engineer are skilled workers, and the oiler and machinist helper, semi-skilled. There are few changes demanded in the types of these workers due to the use of machinery.

The accompanying tabulation of comparative labor costs taken from an old type of furnace and from a furnace of the modern type shows the changes that have taken place in furnace operation.

The transfer from the older to the newer methods shows an elimination of 37 men and a reduction of the total daily labor costs of \$86.32. And furthermore, the 37 men are displaced from the lower-type jobs—bottom-fillers, barrow-men and top-fillers. This tendency toward higher types registers itself in the average wage rate of 23.9 cents for a modern furnace in contrast with 22.4 cents in an older type of furnace.

#### Results of Blast Furnace Inventions

From the 25 blast furnaces investigated the facts warrant the following conclusions:

Mechanical invention is coming into every part of blast-furnace operation.

There is a diminution in the number of workers required. The average amount of labor to operate under the older method was 50 laborers per turn. The new methods call for 30 men per turn. The older form of furnace makes from 150 to 200 tons of iron per day, while a modern furnace makes from 400 to 500 tons per day.

Machinery has made the work safer. About 60 per cent of the fatal accidents of a furnace occur to top-fillers, and the displacement of the top-filler by the skip-hoist eliminates these. Also the skimmer and mud-gun have made the helpers' work immeasurably safer.

Mechanical methods demand a higher type of worker with more intellect and less physical power. Top-fillers, bottom-fillers, barrowmen, and pig-bed men are the men whose occupations call for nothing more than brute force and physical energy. Yet these are the very positions that have been displaced by machines.

#### Open Hearth Furnace Occupations

In the operation of the open hearth there are four distinct working levels of labor operations: (1) The Charging Floor. (2) The Ladleman's Platform. (3) The Ground or Pit Level. (4) The Electric Cranes.

In addition to these four there is much miscellaneous work, as skull-cracking, relining ladles, cleaning brick, etc.

##### The Charging Level

The labor positions on the charging level are the melter, first and second helper, charger,

pull-up boys, and gas-men, all of whom in turn are interested in getting stock and fuel into the hearth and in the actual operation of the furnace. Machinery has done little to change the fundamental demands made of the melter or his helpers, either as to numbers or qualifications; also as regards pull-up boys, although their work has been made somewhat easier due to improved power machinery. The great labor changes are in the new conditions brought about by the charging machine and the mechanical methods of operating gas producers.

The charging of the furnace has had a marked influence on output and on labor conditions. The early method of stocking the furnace was by hand and was the hardest and most strenuous of the whole steel industry. Negroes and Irish were employed almost entirely. Six to eight men were required to fill a 25-ton furnace by hand. To operate six 25-ton furnaces about 40 unskilled workers were needed.

The charging machine has revolutionized the industry. One skilled employee operating a charging machine can stock six to eight furnaces which, filled by hand, would have required 40 men. Besides, the furnaces are now so large that it is doubtful if men could distribute the iron sufficiently well to do good heating.

Hand chargers at Steelton received 13 cents an hour; at Harrisburg they received 15 cents an hour. Everywhere the common labor wage was usually paid. At one plant to-day 27½ cents per hour is paid for the machine charger; at another 28½ cents is paid. At two other plants 30 cents per hour was received. The following table is an approximate comparison of the labor cost of charging by hand and machine:

Method	Number of Men	Rate of Wages, Common Labor	Total Wages Daily	Output, Tons
Hand.....	36	Then 14c., now 20c.	\$72.00	90
Charging machine	5	* 27c.	13.50	600

#### Gas Producer Operation

The introduction of mechanical methods of charging and poking gas producers has reduced the number of men required for a battery of 8 to 10 producers from 18 or 20 to 5 or 6. The work is common laborer's work and the men receive 18 to 22 cents per hour.

The men concerned with pouring operations are pourer or ladleman, nozzle-setter, and nozzle-setter helpers. The nozzle-setter has from four to as high as 18 or 20 men. The shift from the stationary ram cranes, which were situated at every furnace to the overhead traveling cranes, has reduced the number of helpers.

Two furnaces fitted with stationary cranes required 37 men in the pouring process, whereas only 12 men were engaged in the pouring work at Steelton, where the most recent types of open hearths with traveling cranes are being operated. This change of crane operation was the only mechanical or labor change noted on the pouring level.

#### The Ground Level

Several mechanical factors have been introduced which have decidedly changed the labor conditions for pit men. They are: (1) The use of traveling cranes for cleaning-up work has reduced the necessary labor force of pitmen almost one-half. (2) The thimble has eliminated a great deal of the slag work. (3) The use of ingot molds placed upon cars. (4) The mechanical stripper. This machine has removed both men and danger from the pit.



Where 8 or 10 pitmen were constantly at work with a crane to do stripping, the mechanical stripper operates with only one employee. The operator of the stripper is treated on the same basis as a craneman, receives the same wages, and has the same ranking.

#### Crane Level

Cranes have been a marked influence in removing common, unskilled labor from the steel mills. The important thing to note in the coming in of cranes, especially the electric cranes, is the shift in type of labor needed. In every mill investigated the craneman, save for exceptional instances, were native whites receiving 8 cents to 10 cents per hour more than common labor. The great demands made upon cranemen in open-hearth work is not physical power, but skill and vigilance.

#### Outside Labor

The lifting magnet has displaced earlier methods of skull cracking. Formerly 20 to 25 "Hunkies" were used at one works to break up skulls, costing \$30 to \$35 a day in wages. With the magnet all the skulls were broken and collected with but four workers, two skilled men to operate the machinery and two laborers for helping.

Figures approximating this change were given as follows:

	Number of Men	Total Daily Wages	Hourly Rate
Hand or sledge breaking.....	20	\$36.00	\$0.18
Lifting magnet .....	4	9.10	.22 $\frac{1}{4}$

In summarizing the labor changes characteristic of the open hearth in general, one finds a large falling off in the number of unskilled labor required, and an increased demand for skilled or semi-skilled workers. Mental control is demanded in lieu of physical power. It is impossible to obtain statistics of comparative total income in open-hearth operation. Many men are paid on a tonnage basis, others part tonnage and part time, while still other groups work entirely on a time schedule.

A comparison is possible, however, as regards the total amount of labor required to operate an old and a modern furnace. One employer gave the following estimate from his experience:

*Labor Force in Modern and Older Types of Open Hearths  
(Necessary Labor Supply to Operate Four 50-Ton Furnaces  
24 Hr. in Two 12-Hr. Shifts)*

Occupation	Older	Modern
Melters .....	2	2
Helpers (first).....	4	4
Helpers (second).....	8	8
Ladlemen .....	2	2
Nozzle-setter .....	2	2
Nozzle-setter helpers .....	6	2
Door boys .....	8	6
Stockers, gas-men and chargers.....	38	10
Pitmen .....	32	14
Stripping ingots .....	14	4
Skull cracking and scrap.....	26	4
Total .....	142	58

If we analyze the table carefully with a view to dividing the labor into that which predominantly is physical and that which in the main is mental, the above figures would give:

Type of Work	Old	New
Mental control (skilled labor).....	10	28
Physical power (unskilled labor).....	132	30
Total .....	142	58

### Machinery and Man

The observations and data collected warrant the statement that the mechanical inventions introduced require a far less amount of labor for carrying on specific operations. This does not mean that fewer men are working in open hearths and blast furnaces, taking the nation as a whole. These industries have grown, and are continuing

to grow, to such extent that an increasing number of men is being needed. The work is safer. The popular notion that greater machinery means greater danger to workers finds no confirmation in fact when the blast-furnace and open-hearth industries are considered. As was seen in the blast furnace, so also in open-hearth plants, not more, but fewer accidents occur with the coming in of mechanical appliances. The machines have displaced dangerous occupations, as, for instance, the skip-hoist removing the top-fillers, and the stripper doing away with the need of pitmen.

Another conclusion is that a higher type of man comes hand in hand with machinery. The results in both industries, and especially in the open hearth, show without question that a different and higher type of worker is needed. The change observed is mental control removing physical effort, a general shift from muscular power to intellectual skill. A step from heavy, cumbersome, physical labor to alert, keen and ever-awake mental activity represents a change from a lower to a higher man, just as our civilization with its intellectual growth has advanced above the Fiji Islander, who still depends on physical strength.

But observe the "higher type" from a far more practical point of view, namely, the increased cost of errors that comes with greater machines. In the industries studied the costliness of mistakes made by workers varies in direct ratio to the increase in mechanical methods.

If no other proof were found than this growing costliness of error which comes with machinery, it would be sufficient to show the need of a more careful intellectual worker. Facts bear out Dr. Carrol D. Wright when he claims that muddled brains are in danger when working near complex machines. Observe also that complex machines are in danger when muddled brains operate them. A more complex machine and a higher type of labor becomes the natural adjustment.

Machinery is becoming more complex and more gigantic in influence; therefore the more responsible the labor effort required in its operation. And for labor to meet the needs of new machinery the call is for stronger minds, not stronger muscles—for mental superiority, not for physical prowess.

### Amalgamated Association Convention

The annual convention of the Amalgamated Association of Iron, Steel and Tin Workers opened in St. Louis last week. Wage scales for bar-iron, sheet and tin-plate mills in the Central West that sign the Amalgamated scale will be formulated. It is probable that material increases in wages for all these scales will be asked for this year. It is also not unlikely that the Amalgamated Association will present scales for signature to sheet and tin-plate mills which heretofore have been operating as non-union mills. Much quiet work has been done recently by the association in the direction of unionizing sheet and tin-plate mills, the association believing it is an opportune time to do so, owing to the immense demand for sheets and tin plate, and the very profitable prices ruling.

The American Forge & Machine Company, Canton, Ohio, is turning out forgings from  $\frac{1}{2}$  lb. up to 15 tons in weight, and has just installed some new equipment in the way of large hammers and presses to take care of its constantly increasing business.

The American Bridge Company has moved its Cleveland office from the Rockefeller Building to the Guardian Building.



### Special Coal-Handling Gantry Crane

The Cleveland Crane & Engineering Company, Wickliffe, Ohio, has furnished a special type of gantry crane for handling coal to the Porto Rico Coal Company, San Juan, P. R. The crane can be used for unloading coal from boats and depositing it on the stockpile or

### New Storage Battery Industrial Truck

An electric floor truck for use in industrial plants is being built by J. E. Haschke, 115 West Redondo Street, Los Angeles. The motor is mounted on the yoke of the front wheel, which is of the caster type, and a high-speed electric motor is used that can be



This Gantry Crane Unloads Coal from Vessels with a Clamshell Bucket and Deposits It on the Stockpile and Takes Coal from the Pile and Delivers It to Railroad Cars Through a 12-Ton Suspended Hopper and Two Swinging Spouts or to Passenger and Other Vessels Through a Portable Hopper and Telescopic Spout Rigged Up on the Cantilever

for taking coal from the pile and loading it into railroad cars or passenger and cargo vessels. Regenerative braking is employed when the load is being lowered and the cantilever, which is hinged at one end, can be raised or lowered.

The span of the gantry is 127 ft. and the trolley track, which has a gage of 8 ft., is 48 ft. above the dock level. The trolley wheels are 20 in. in diameter and are spaced on 14¼-ft. centers. The maximum loading is 10,000 lb. on each of the four wheels, all of which are geared to the trolley motor, this arrangement being relied upon to insure quick acceleration from rest to the maximum speed of 800 ft. per min. The main trucks have a wheelbase of 12 ft. and are 40 ft. between centers. Each of the trucks has four wheels which are connected by gearing to two motors located one on either side of the main girder toward the cantilever end. Automatic rail clamping devices, which can be released by the operator from the control cage when the gantry has to be moved, are provided for the trucks. The mechanism for raising the 95-ft. cantilever is housed at the top of the main girder and is operated from the cage under the hinge point of the cantilever, all of the functions of the crane being controlled from this point.

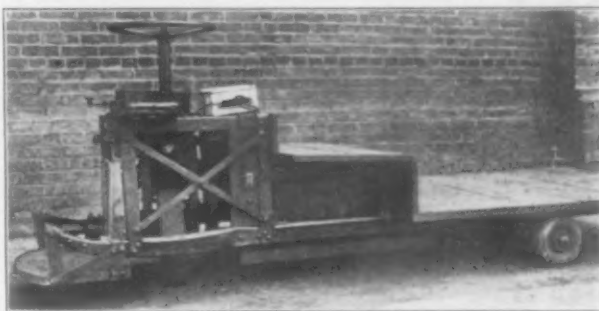
The crane is provided with a 3½-yd. clamshell bucket, which is raised at a speed of 300 ft. per min. The capacity of the crane when taking coal from boats and depositing it at the center of the gantry span is 180 tons per hr. A 12-ton suspended hopper with two swinging spouts over the railroad tracks provides means for loading cars, while for fueling vessels a portable hopper with a telescopic spout is rigged up on the cantilever to reach the chutes in the sides of passenger and cargo boats. The structure is designed to carry a wind load of 50 lb. per sq. ft. of exposed area to withstand the West Indian hurricanes.

### Stellite for Metal Cutting

The Fonderie des Gobelins, Paris, France, has increased its daily production of 155 mm. shells from 120 when high-speed steel was used to 200 when stellite was used. According to *Metaux et Alliages*, of Paris, the cost of stellite for finishing 1000 shells of this size was about 6c. per shell. With a cutting speed of 17 meters (about 56 ft.) the roughing of the shell and the finishing of the shell each took 21 min. with high-speed steel. When stellite was employed, the roughing out period consumed 11 min., while the finishing work required 4 min., the cutting speed in roughing being 25 meters (82 ft.) and in the finishing work 37 meters (121 ft.).

operated at various rates without employing resistance in the circuit or paralleling the field coils or the cells of the battery.

The current is supplied to the motor from a storage battery at a value which is said to be below the normal discharge rate, thus increasing the life of the battery and the radius of action of the truck. The motor,



Mounting the Motor in a Yoke Above the Front Wheel Enables the Truck to Turn in a Very Small Space

which is mounted on the yoke of the front wheel, transmits power through a set of gears. As this wheel is of the caster type, it is explained that the truck can be turned within its wheelbase, which is an advantage where the space available for operation is limited. The weight of the truck is approximately 1500 lb.

### Australia's Tin-Plate Supplies

Reference was made in *THE IRON AGE*, Dec. 28, 1916, to the prohibition of imports of tin plate into Australia. Representatives have been made to the governmental authorities on the subject, according to the *London Ironmonger*, and a revision of the order is promised. The maximum price to be charged for tin plates by the order in the different states of Australia was £1 15s. for each box 20 in. x 14 in., net, delivered at all ports of importation, with the cost of transportation added elsewhere throughout the commonwealth. This price has been challenged by importers as absurdly low. Extensive contracts have been entered into at much higher rates. Some shipments now arriving from England cost over 40s. to land. The embargo placed upon tin plates from other countries than Great Britain is also objected to as calculated to injure British interests. Orders had been placed in America at comparatively low prices, and if these are disallowed the consumer will suffer as well as the merchant.

# Renewing Worn Rails by Rerolling

Varied Designs, Covered by Patents Held by American McKenna Process Company, Make Rerolled Rails Interchangeable with New—Adaptability to Curves

**F**OUR patents embodying new ideas in rail-section design whereby even badly worn rails are being successfully rerolled for railroad use, have been granted to George Langford, general superintendent American McKenna Process Company. The company has mills at Joliet, Ill., Kansas City, Kan., and Warners, N. J. The process of rerolling is conventional so far as equipment and methods are concerned, consisting of bringing the entire length of the rail to a temperature short of materially affecting the quality of the metal. The heating furnace may be fired by coal, gas, oil, etc. The rail is passed through two sets of rolls which in practice have been placed in tandem. Only a slight amount of work is done on the web and flange, enough to avoid distortion of the rail section, and the original angle bars can be used with the rerolled rails, the latter being an important consideration.

## SYMMETRICAL AND UNSYMMETRICAL HEADS

The designs, for which patents were granted in January of this year, provide for two general types of rerolled rails, one being designated as symmetrical, as shown in Figs. 1 and 2, and unsymmetrical, as shown in Figs. 3 and 4. Fig. 2 illustrates a symmetrical rail rerolled from a badly worn rail, and is designed for use on curves. Fig. 4, also rolled from a badly worn rail, has an unsymmetrical head, and likewise is applicable to curves. The advantages of the rails shown in Figs. 2 and 4, for use on curves, arises from their narrow tread. They are used as the inner rail on which it is desirable to reduce the bearing area so that as the wheels round the curve the inner wheel will slip because of the decreased amount of contact, and allow the outer wheel to run ahead. This is not a new theory or application, as there are other types of so-called frictionless rails. It will be noted that in the case of both of these rails the design is such as to preserve full surface for support by the angle bar, the support being greater on the gage side. In the case of the unsymmetrical type, the sloping side of the head is laid to the outside of the track, the gage side, of course, of all rails being in alignment.

## DISTORTION OF RAIL SECTION AVOIDED

A feature on which stress is laid is that the heads of the rerolled rails are made to conform in

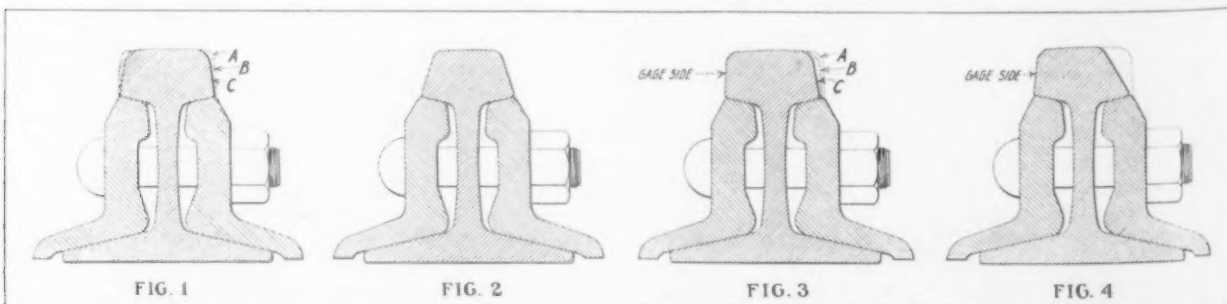
design to the shapes of the worn rails from which they are rolled, with a view of avoiding distortion of the rail section, leaving the head, web and flange balanced. If it were attempted to make a badly worn rail conform to standard design there would be danger, it is pointed out, if not the certainty, of excessive distortion, with a consequent impairment of the strength of the rail. Early attempts at rerolling old rails has in view the restoration of the standard section, but the difficulties encountered with rails very badly worn were so great that the effort was abandoned, and it was sought to make a symmetrical rail with a taper on both sides.

In the utilization of rails which are very badly worn, as they are likely to be on curves, the use of an unsymmetrical shape has been found acceptable, as the process in reality utilizes the absence of metal on the worn side. The changes in the essential portions of the rail, aside from reduction of the head are but slight. The object is to renew the rails with a minimum change in the physical structure of the steel, and the process moves the metal to such a slight degree that the work can be done at a low temperature. When rerolled, a standard A. S. C. E. 100-lb. rail is reduced to about 92 lb., preserving the original length, or to a 90-lb. rail 1 ft. longer than the original, i.e., a 33-ft. rail becomes 34 ft. long after rerolling. Lengthening rails in this manner is proving of interest to the railroads.

The Michigan Central Railroad is now having 100-rails rerolled to 90 lb., with unsymmetrical heads; the Chicago & Northwestern has used the unsymmetrical head, likewise the St. Louis & San Francisco. The Chicago, Milwaukee & St. Paul is using a rerolled rail with symmetrical head.

## GAGE-SIDE DIMENSIONS ARE STANDARD

In his patent application covering the design of the symmetrical rail, Mr. Langford states that the finished product is substantially standard in all its dimensions except as to the head and the fishing on one side; the head, while being unsymmetrical, conforming on the inner or gage side substantially to the outline of a new standard rail. The outer side of the head slopes inward, but at its base it is substantially of standard width and contour, permitting the use of standard fittings, and being interchangeable with new standard rails. The patent application also covers the rerolling of badly worn rails to sections with unsymmetrical heads with



Sections of rails rerolled from old rails of various degrees of wear by American McKenna Process. Contours A, B and C are determined by the area of the worn rails. Fig. 2 shows a rail from badly worn rails for use on curves: the sloping sides of the head may be varied to control the width of the tread. All three sections of Fig. 3 are in alignment with each other curve and tangent rail is on the outside of the track.

slope equal on both sides of the head, but greater than that of the original rail.

After delivery at any one of the company's plants, the worn rails are carefully sorted, according to the degree of wear, into separate piles designated as A, B and C, each being suitable for rerolling into some one of the various types. In practice, the A, B and C grades will average about 75, 15 and 10 per cent respectively. These lots are rolled and shipped separately into a series of A, B and C sections in which all dimensions except width and slope of head are kept uniform. The A section is always rolled with a symmetrical head, the new process being particularly directed at the more badly worn rails. Before rerolling, the rails are passed through a grinding machine which removes the fins which have resulted from the pounding of the wheels.

#### CLAIM ADVANTAGES OVER NEW RAILS

In comparing the rerolled sections with other standards of the same weight per yard it is claimed that the moment of inertia and section moduli of base and head are greater in the rerolled section than in the standard sections of the same weight per yard, and the neutral axis is nearer the base.

It is also claimed that from a metallurgical standpoint the new sections have decided advantages in that the shape of the rail head insures proper work upon it in the rolls; also that the reduced percentage of area permits uniform cooling of head and flange, thus minimizing the danger of internal strains and failure in service.

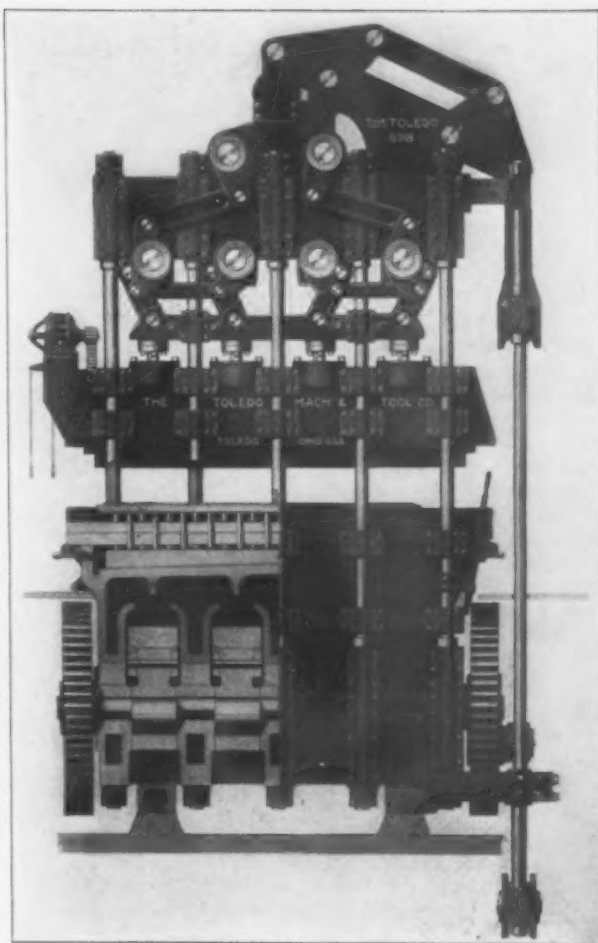
### Toggle Automobile Rail Forming Press

A new double-action toggle press designed especially for forming rails for automobile frames and other forming work that requires accuracy and uniformity, and with which it is claimed very rapid production is possible, has been brought out by the Toledo Machine & Tool Company, Toledo. The first presses used for forming automobile rails were of the hydraulic type and later single-action crank presses were employed for this purpose. Both hydraulic and power presses are found in stamping plants engaged in turning out automobile frames in large quantities, the two types being generally used for forming different kinds of rails.

The first Toledo press of the double-action toggle type for rail forming was built for the Willys-Overland Company, Toledo, and was recently installed in that company's stamping plant. This machine has a capacity for exerting a pressure of about 2000 tons. It will form pieces 17 ft. long of chrome nickel or other high-grade steels  $\frac{3}{8}$  in. in thickness. An idea of the size of this machine will be gained from the dimensions. It is 15 ft. front to back, 20 ft. 8 in. right to left and 31 ft. from the base to the extreme top. It extends in a pit 8 ft. below the floor line. The complete weight of the machine is 650,000 lb., or 325 tons. It is operated by a 125-hp. motor. It is practically all of steel construction and some of the single parts weigh approximately 40,000 lb. each. Six flat cars of a large capacity were required for its shipment.

In the production of rails for automobile frames, it is considered essential that the vertical web be free from warping or buckling. In this press the blank is held firmly between the top of the die and the blank holder during the process of forming, so that, it is stated, warping or buckling is impossible, and all subsequent hand straightening is avoided, thus eliminating the expense entailed by this method of straightening.

The machine is self-contained and employs only two motions in the process of production. One slide comes down and clamps the flat blank or sheet without any belt exertion, holding the blank flat while the second movement of the machine forms the sides of the channel or frame, and continuing on to the completion of one orbit when the finished channel rests free of all die obstruction on top of the die. The formed part is then

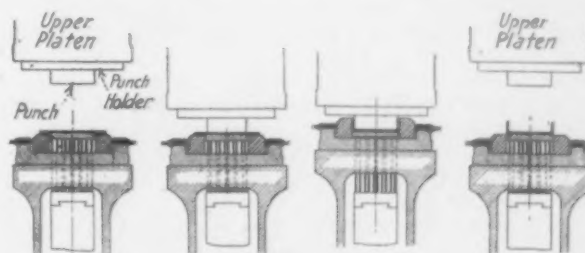


Double-action Toggle Press for Forming Rails for Automobile Frames, Which Is Located in a Pit Extending 8 Ft. Below the Floor

ready to be swept off without the necessity of prying off or stripping. The channel, frame, or other part formed on the machine is said to be free from buckle in the web and from twist in its sides. It is claimed that over 90 per cent of the actual labor required in producing forms of this type is saved because of the elimination of hand processes of straightening.

The press operates at about seven strokes per minute, producing two complete rails of normal size and shape, one right and one left rail at each stroke. It is stated that one operator and two to four helpers, depending on the size and shape of the rails, are sufficient to operate the machine.

The frame of the press is massive in construction, and is securely held together by large steel tierods



The Successive Positions Assumed by the Die and the Punch in a Complete Cycle of the Press

that take the stress. The crown, bed, blank holders, yokes, links and smaller castings are all steel to give the maximum strength to withstand the enormous pressure required for the work, the machine being designed to provide ample power and strength. The shafts are of the eccentric type, are hammer forged of special analysis steel, high in carbon, and are of large diameters. The press is fitted with a Toledo friction clutch operated by a hand lever, which gives the operator control of the machine at all times and enables him to stop or start instantly at any point of the stroke.



# New Sidelights on Electric Steel Making

## American Electrochemical Society Discusses a New Form of Duplexing—Government Specifying Electric Castings—The Power Problem

**T**HE rapid growth of the electric steel industry, both in the steel plant and foundry, and various phases of that industry relating to the types of furnaces, their operation and product, were discussed at the thirty-first general meeting of the American Electrochemical Society held at Detroit last week. Aside from a short business session, one entire day was devoted to electric furnaces and electric steel making, and during other sessions papers of interest to steel makers, on acid resisting properties of alloys, corrosion of cast iron, and electrolytic picking of steel were read and discussed.

The co-operation of the various technical societies with the Navy Department was referred to in reports and attention was called to the large representation the society has on the Naval Consulting Board. The meeting was held at the Statler Hotel, May 2 to 5, and was attended by nearly 200 members. This number was somewhat smaller than the attendance at the last meetings held in the East, but the membership is larger in the East than in the Central West.

The first paper, "Comments on the Electric Steel Industry," was prepared by Dr. John A. Mathews, president of the Halcomb Steel Company, Syracuse, N. Y., but was read by Prof. J. W. Richards, Lehigh University, secretary of the society. This gave a review of the inception of the industry, its early development and present achievement. It was pointed out that the United States has now taken the lead in electric furnace development after a very slow start, and that the electric steel production is now about eight times as great as the crucible steel production and one-eighth that of Bessemer production. The two latter processes are not declining, but are more or less stationary. A large portion of this paper is printed in another part of this issue.

### Superiority and Cost of Electric Steel

In a discussion of Dr. Mathews' paper, C. F. Lindsay, Ottawa, Ontario, said that all munition steel that was not electric steel, which was used in Canadian munition plants, had laminations and "ghost" lines, but that these defects were not present in electric steel used for munitions. He referred to the new electric steel plant being built by the Canadian Government, and which will have 10 six-ton Heroult furnaces as the largest electric steel plant in the world. Dr. Richards replied that this would be exceeded in capacity by the 30-ton electric furnaces of the Illinois Steel Company.

Robert Turnbull, Welland, Ont., stated that to-day steel can be made by the electric furnace cheaper than by any other process except the basic open-hearth. Electric steel is being made in Canada to-day at \$15 to \$18 a ton cheaper than by the acid open-hearth process. This difference in cost, it was pointed out, was due to the high-priced materials required for the open-hearth process, and to the comparatively low-priced scrap that can be used as the electric furnace charge.

In a paper on "The Electric Furnace for the Production of Small Steel Castings," R. T. Flintermann, president and general manager of the Michigan Steel Casting Company, Detroit, described the processes used in his plant for making small steel castings. He declared that there is no question of the superiority of both acid and basic electric steel over the converter metal, and enumerated various points of advantage found in the electric. He experienced much trouble with slag in the basic process, but these difficulties disappeared when he changed to the acid process and he is now using only acid linings and bottoms.

### A "Reversed Duplexing" Process

The minimum of slag trouble with acid steel, the

speaker said, suggested that an ideal arrangement for a steel foundry would be to use a "reversed duplexing" process. A nearly full presentation of the paper elsewhere in this issue gives the details.

### The Government Specifying Electric Steel

Prof. E. D. Campbell, University of Michigan, Ann Arbor, discussed the reversed duplexing process proposed and suggested its use for the manufacture of high-grade steel, particularly tool steel. Mr. Flintermann said that he expected a rapid growth in the demand for electric steel castings and that, since his paper was written, he had taken a Government contract for ordnance castings in which electric steel was specified.

Considerable interest was shown in the exhibit by Mr. Flintermann, of a manganese steel casting made for a clutch spider for an automobile. This spider had previously been made of an alloy steel forging, case hardened after being machined, but the loss is said to have been heavy. The manganese steel spider casting was  $\frac{1}{8}$  in. thick in its thinnest section, and was ground over its entire surface,  $\frac{1}{16}$  in. of metal being removed. It was free from imperfections, as required. The spider was tapped on both sides, the tap being in a piece of soft steel welded to the manganese casting, holes being provided for this purpose when molding the casting.

In reply to a question, Mr. Flintermann stated that he found the manipulation of an acid bottom much easier than a basic bottom. Answering the query as to how many heats the roof lasted with a basic bottom he stated that he had a silica roof for a basic furnace and got only 60 or 70 heats on a roof and lining, but he understood that some plants were getting 150 heats for a roof by changing the fluxes and making other improvements.

Professor Richards suggested that some of the trouble that Mr. Flintermann had experienced with thick basic slag might be avoided by adding silica and fluorspar, thinning the slag and consequently making it more liquid. He also stated that he had sent an inquiry to a large number of manufacturers and users of steel castings, asking them how steel castings can be improved and that about 19 out of 20 of the replies were that the improvement would result from the use of electric steel.

### Protecting the Tilting Gears

The details of construction of an electric furnace, the electrical factors, the thermal considerations and the chemical reactions were discussed in a paper entitled "Notes on Electric Steel Making," presented by J. L. Dixon, of the John A. Crowley Company, Detroit. Referring to the mechanical features of a furnace, Mr. Dixon stated that the design and location of tilting gears and electrode raising gears should be such that they will be fully protected from any accidental break-out or overflow of liquid metal. The protection of the electrode raising gears is generally a simple matter, but this is not true of the tilting gear. He referred to a type of tilting gear giving excellent results mechanically that had been abandoned owing to the danger of the gear being damaged by liquid metal.

Mr. Dixon suggested that in designing a very large electric furnace requiring a large number of electrodes, difficulties that result in breakdowns might be overcome by suspending the electrodes by an overhead device independent of the overhead shell of the furnace. This was the most convenient arrangement for furnaces of the stationary type. He strongly advocated the use of the highest possible voltage for melting down the

charge. The higher the voltage, the smaller may be the electrodes and the higher would be the power factor.

In discussing the part of the paper referring to the protection of gears from hot metal, Mr. Turnbull said that in Toronto a roof is being built over the tilting gear so that molten metal from the furnace will stay on the roof or fall back into the pit. Another solution of the problem that has been applied to a small furnace is the effecting of the tilting movement by lowering the front of the furnace by means of two hydraulic rams. He believed, however, that the Toronto method would solve the plan of protecting gears.

#### Steel Instead of Copper Electrode Holders

The subject of electrode regulation brought up in Mr. Dixon's paper was discussed by Mr. Turnbull and John A. Seede, General Electric Company, Schenectady, N. Y. The former said that the tendency is to get away from copper electrode holders and that he has been using cast-steel holders for over a year. He believed steel would finally replace the copper holders. Mr. Turnbull also said that a cast-iron roof cooler can be used instead of copper for 25-cycle current, but he would not recommend the cast iron if 60-cycle current is used. He contended that there is not enough co-operation between steel manufacturers and makers of regulators and suggested that the furnace makers get together with the regulator makers, believing that regulators could be made that would avoid difficulties. He urged that the furnace people tell their troubles to the regulator makers and allow the latter to make the corrections, instead of trying to do it themselves. In reply to a question from Mr. Seede as to whether steel electrode holders were used on large furnaces Mr. Turnbull stated that they are being used on 6-ton furnaces. Mr. Dixon remarked that iron cooling rings have an advantage in that they are cheaper to replace if burned out and eliminate the danger of a furnace charge becoming contaminated with the copper.

A paper on the "Bethlehem Ten-Ton Girod Steel Furnace," prepared by C. A. Buck, vice-president of the Bethlehem Steel Company, was read by Professor Richards. A description of this furnace appeared in THE IRON AGE, May 18, 1916. In Mr. Buck's paper were included details of the general operation using cold charges, the refining by slags, composition of the slag, and of a variety of steels made in the furnace.

The various artificial abrasives and their uses were discussed and the manufacture of grinding wheels of different types was described in a paper by Richard G. Williams, mechanical engineer, The Norton Company, Worcester, Mass. The paper, entitled "The Grinding Wheel—A Connecting Link Between the Electric Furnace and the Automobile," was illustrated with lantern slides showing some of the manufacturing processes and equipment used in making grinding wheels. The speaker stated that the art of precision in grinding has advanced very rapidly during the past few years and that the needs of the automobile manufacturer should get the credit for a large share of the advance. It is now possible to grind more than one diameter at one time with one wheel. This is an outgrowth of the use of very wide wheels, taking extreme cuts without any transverse of the table or the wheel. From 85 to 90 per cent of the grinding wheels in use are made by the vitrified process, being designated as vitrified wheels because the bonding material is composed of various kinds of clay.

#### The Modified Rennerfelt Furnace

A paper on "Rennerfelt Electric Furnace Operation," by C. H. Vom Baur, Hamilton & Hamell, New York, dealt with improvements and changes in that furnace to better adapt the Swedish design to American practice. The improvements noted were as follows: The furnace hearth is now circular with one set of electrodes, and oval shape with two sets; the side electrodes are adjustable in a vertical plane, allowing them to dip toward the bath; the available power for a given sized furnace has been largely increased.

During the discussion of this paper Mr. Vom Baur said that in melting the pure copper with the Rennerfelt furnace, the volatilization loss was found to be

only two-thirds of 1 per cent in a six weeks' run, but with a Heroult furnace the loss was great and the test abandoned. The question was raised as to how long the electrodes would last in a furnace of this type. Mr. Vom Baur replied that a cautious person had broken two in a heat, but he had seen a furnace operated two days without breaking an electrode. He referred to an electrode with a cone type of joint which had been brought out recently, and said that this type seemed to be lasting better than the old type.

A paper on the electrical characteristics of electric furnaces was presented by A. A. Meyer, assistant electrical engineer of the Detroit Edison Company, and contained data secured in an extensive electrical investigation of Heroult and Grönwall-Dixon furnaces in operation at the plants of the Michigan Steel Casting Company and the Detroit plant of the John A. Crowley Company.

#### The Society's Growth

The society has experienced a marked growth during the past year, as is indicated by the report of the Board of Directors read by Prof. Richards, the secretary, showing a net increase of 184 in membership. This report was supplemented by the secretary's report, which showed the present membership to be 1541, or the greatest in the history of the society.

Professor Richards read a report on the Naval Consulting Board, covering the personnel of the board, outlining its functions and mentioning some of the work already accomplished by that body. The report stated that the various committees have already done much valuable work for the Navy Department and that the committee on metallurgy has conducted an inquiry towards securing an improvement in steel castings for the Navy Department. Attention was called to the fact that the board, through its secretary, had taken steps in a movement to secure an adequate supply of nitric acid in this country.

With the view of encouraging students whose means are usually limited, to become members of the society, the constitution was amended so as to permit the admission without initiation dues of young men in actual attendance at colleges.

#### The Niagara Power Problem

The report of the Board of Directors on water power legislation read by the secretary stated that electrochemical industries of this country are suffering from lack of water power, and expressed the belief that means can be provided for greater use of the water at Niagara Falls without interfering with its scenic effects. The report suggested that a joint commission of American and Canadian engineers be appointed to take up the matter of greater utilization of the Niagara Falls water supply, considering it from the standpoint of scenery, navigation and power, and urged that the United States government assume the initiative in this matter. The society went on record as favoring the proposed joint conference by approving the report.

#### New Officers

Dr. Collin G. Fink, research chemist, Edison Lamp Works, General Electric Company, Harrison, N. J., was elected president of the society for the ensuing year, succeeding F. A. J. Fitzgerald. Other officers elected were as follows: Vice-presidents: H. C. Parmelee, Colorado School of Mines; F. C. Frary, Oldbury Electrochemical Company, Niagara Falls, N. Y., and J. W. Beckman, Beckman & Linden Engineering Corporation, San Francisco, Cal. Managers: L. E. Saunders, manager of the abrasive plants, Norton Company, Niagara Falls, N. Y.; Dr. J. A. Mathews, president, Halcomb Steel Company, Syracuse, N. Y., and A. T. Hinckley, National Carbon Company, Niagara Falls, N. Y. Prof. J. W. Richards, Lehigh University, South Bethlehem, Pa., was re-elected secretary, and P. G. Salom, Philadelphia, was re-elected treasurer.

During the meeting two afternoons were spent in visiting Detroit plants. One trip was to the automobile plant of Dodge Brothers, and the other afternoon was spent visiting the steel plants of the Michigan Steel Casting Company and the John A. Crowley Company, both of which have electric furnaces.

# The Manufacture of War Munitions

## Finance, Organization, Materials, Design, Inspection, Methods of Manufacture, and the Selection of Machines for Rapid Production

THE American Society of Mechanical Engineers at its spring meeting in Cincinnati, to be held May 21 to 24, inclusive, will hold several sessions devoted to the manufacture of war munitions. This will deal with probably every phase of the subject from the financing of munition contracts and organization of plants to the design and actual manufacture of the material. Eight papers which have been arranged for this session are condensed below:

### Munitions Contracts and Their Financing

BY FREDERICK A. WALDRON  
Industrial Engineer, New York

It is sufficient for the manufacturer to know that the work which he is to do will be regularly and promptly paid for and any risks taken by him to produce in quantity within the time specified are to be amply protected by an advance of money sufficient to cover the expense of preparation.

Undoubtedly the cause of failures in the delivery of munitions of sufficient quantity within the time specified is directly traceable to the lack of judgment in the amount of money demanded as advance payment, combined with a lack of business and financial management.

If we review carefully the ratio of the amounts advanced to the total amount of the contract and its time of completion, it will be found that in no case has a sufficient advance been made to enable the contractor to finance this work on the same basis as he would adopt in the conduct of his regular business.

Financing is providing the coin of the realm in adequate and opportune quantities for the purpose of obtaining an object desired. Where ready cash is not available, the usual way of providing the coin of the realm is by the issue of mortgages, bonds or notes.

On large munitions contracts, the bonds of sub-contractors are marshaled by the general contractor and deposited as security. This is to indemnify the purchaser against loss. In fact, the bond is the purchaser's insurance to secure him against failure to complete the work, or the dissipation of moneys paid by the purchaser to the contractor as an advance payment. A bond is also required by those financing the work.

#### Advance Payments

The general contractor, on a large munitions contract, has to provide in turn advances not only to the sub-contractor, but he must also be able to take advantage of the market, and oftentimes buy materials long before they are required. He has also to meet the payments for materials of sub-contractors furnished long in advance of the time they are to be used. Then again, contracts have been let to some small concerns who have failed to fulfill the requirements of the contract. This also applied to the larger sub-contractors and, as has been the case, it is necessary for the general contractor, in order to protect himself, to take control of the entire properties of the sub-contractor on an entirely different basis and under entirely different conditions. This involves delays not ordinarily estimated in the contemplation of the work to be done.

A further necessity for ample and proper financing during the progress of the contract is that assembling contractors be supplied with a sufficient number of component parts of proper quality in order to complete the work.

Then, again, the question of financing depends to a large extent upon the Government with which the general contractor is dealing. With some there is no trouble, and businesslike methods are used in the handling of all financial transactions. There are others, however, that

are exceedingly troublesome and irregular in meeting their financial obligations and, while they are good for the money obligated, the irregularity and slowness of payments oftentimes create suspicion and distrust on the part of the manufacturer, with a corresponding demoralization.

After an observation and experience of two years in this work, the writer feels safe in assuming that an advance of at least 25 per cent is necessary and 33 1/3 per cent would leave a margin of safety, with good management. It is not necessary that all of this amount be paid upon the signing of the contract, but it should be available for drawing upon as occasion might require.

The rate at which advance payments should be liquidated is a matter which can only be adjusted to the requirements of the case in hand. A good rule to follow is to deduct from each invoice the same percentage of this invoice as would liquidate the advance payment upon the completion of the contract.

#### Payments on Account

Payments on account depend on the resources of the contractor, volume of business, rate and quality of materials delivered, general progress of the work, and complete audit information as to the financial condition of the contractor.

The amounts of these payments are generally made on the invoice value of the materials shipped, less deductions for the liquidations of the advance payments and insurance to the purchaser.

Where the financial standing of the company is such as enables it to have cash on hand or available to conduct its business, payments are taken in bonds or short-term notes of the Government for which the work is being done.

Final payments should be made as promptly as possible upon the completion of the contract. It is hardly possible, in the majority of contracts, to make these final payments promptly, as it oftentimes involves the adjustment of debits and credits for expenses on the part of the contractor and rejected work or spoiled materials on account of the purchaser. It is essential, therefore, in order to have a prompt adjustment, that a close check be kept on the progress of the work at all stages and a clear and definite method of maintaining records be kept by both purchaser and contractor.

### Organization for Munitions Manufacture

BY HARRY L. COE

Vice-president Harpham, Barnes, Stevenson & Coe, Inc., Boston

It would seem that the greatest success would be obtained by comparatively small units specializing in one type of munitions. The manufacturer must build an organization around such of his men as possess the proper habits and training, and they in turn will have to see to the development of the manufacturing units. Large and complicated units do not develop rapidly, and in them mistakes are tremendously expensive and slow to correct. The manufacturer should, therefore, take stock of his organization carefully. If it does not contain men whose habits of thought and training are consistent with specialization of processes and mass production, it lacks one of the prime factors in successful munition manufacture.

#### Adaptability of Plant to Product

If, on the other hand, the organization is of this type, he should look carefully over the wide range of articles classified as munitions and select something which is as similar as possible to his regular product in size, material, and general nature. It is futile to try to



handle a projectile department as an appendage to some other part of the business. It is a business in itself and its success or failure will probably depend on the completeness with which every detail is worked out and checked.

This is a product in which duplication inside exceedingly small limits is essential. The type of munitions manufactured will be limited to a few pieces, or even to a single piece, of the same nature. The size of the order should be large enough so that even the smallest working unit—man or machine—can be employed constantly on the same operation. Under such conditions no detail is so small but that it pays to give it careful attention.

#### Organization

The internal mechanism of the organization might be classified somewhat as follows: 1. General Service Department. 2. Diplomatic Staff. 3. Production Department. 4. Inspection Department.

Under the General Service Department, we find (a) Records and accounting (with special prominence given to control of manufacture rather than to details of cost finding). (b) Purchasing and stores organization. (c) Designing, drafting and experimental development. (d) Protection and safety (with special reference to destruction by representatives of the enemy's Government and to the safeguarding of unskilled workers).

#### Diplomatic Staff

This organization will be small, but important. If the munitions are for a foreign Government, there will be foreign representatives at the plant as receivers. These men are not accustomed to our methods. Their temperament is entirely different from the people we are ordinarily meeting. If sufficient attention is given to them, and their points of contact with the organization limited as far as possible to a few chosen men, it will be much easier to reach a practical working basis.

The diplomatic staff sees to it that any instructions issued by the receivers are transmitted to the proper department so that they go into effect. Through this department, the shop can approach the receivers for information or rulings on conditions which may not be clear. Even in the cases of work for our own Government, I believe such a department is advisable.

#### Production Department

The Production Department comprises: (a) Maintenance of equipment. (b) Operation of equipment. (c) Selection and training of workmen. (d) Tool and gage production. (e) Establishment and operation of wage payment and penalties systems.

This department is responsible for maintaining production and developing economy, and has full control of all agencies which bear directly on the operation of equipment.

Maintenance of equipment has been included under this department for two reasons: First, it brings the time element of repairs largely under its control. Much loss of production can be avoided by a careful and frequent inspection of machines and transmission. Second, the men who make up the maintenance crew are usually the general group of millwrights who see to the location and moving of equipment, which again is a direct corollary of production. In this connection twenty hours per day is about the economical limit to run machines under the conditions of forced production usual on this work. The extra four hours for repairs is most excellent insurance.

Because of the difficulty of getting skilled mechanics, it has been necessary to develop that type of an organization which can produce results with the average workman in the shortest possible time. It is well to subdivide the operations into simple elements and eliminate complex machines. Because of the very nature of the class of workmen available, it is necessary to make the most out of a continually changing force. This has been done successfully by selecting from the better grade of men a class which might be called tool setters or machine starters, and giving them charge of a battery of machines. Behind these machine starters come the group foremen, assistant superintendents, etc.

For somewhat the same reasons the tool and gage

manufacturing department is made a part of the production chief's organization. The tool and gage department has to be a real manufacturing department with the demand for flat cutters, boring bars and heavy supplies of special tools which immediately occurs when one starts to reach maximum output on single-operation machines. The good tool maker is not as a rule a production man and it is difficult to get a tool room into the spirit of manufacturing.

The method of wage payment is immaterial provided a maximum incentive is given to each man. The setting of standards is an important part of the wage basis and the opportunities for the competent operation and time-study man are wonderful. He, too, is part of the production chief's organization.

#### Inspection Department

The work of the Inspection Department comprises: (a) Inspection of operations. (b) Intermediate inspection. (c) Final inspection.

The writer believes that better results and a more consistent and thorough inspection will ensue by creating a staff of inspectors responsible to their own chief to handle all inspections wherever they occur. It is easier to train men for these jobs and instill into them the necessary standards of work and habits of thought and action if they are included in a branch of the organization which is all their own.

Assuming that the complete inspection is organized into a department of its own, it may well develop according to the following scheme:

If the work has been subdivided so that operations occurring on individual machines are simple, it is possible to station back of each group of machines an inspector or inspectors and gage every piece for the controlling dimensions to see that each piece produced falls inside the tolerances which are allowed.

As the work progresses and a series of operations are performed upon a piece, it is often found desirable to have an intermediate inspection, as in many cases the later operations materially change the form of the piece so that it is impossible to check the work previously done. It is usually found desirable to set aside a certain part of the shop for this purpose and have all the product delivered to the inspection room. This intermediate inspection is a general over-all check on the production reported by the operation inspectors.

When a piece is finally finished and ready for presentation to the receivers, either of our own Government or of a foreign Government, there should be organized a thorough final inspection. Under this final inspection, all dimensions possible are checked and in general the same procedure as may be instituted by the receivers is followed out. In case the product does not come up to the standard, it is either sent back for repairs or else set aside and presented as a special batch with full explanations to the receivers.

In connection with the inspection organization, it is necessary that an ample gage-checking force be organized. All working gages should be checked at least once a day and, in case of some of the finer type of gages, it may be necessary to check oftener if the standards are very exacting.

### Design of Munitions for Quantity Manufacture

BY J. E. OTTERSON

Vice-president Winchester Repeating Arms Company,  
New Haven, Conn.

Design will here be taken as including not merely the general conception of the particular product which might be termed the inventive design, but also the full consideration by the designer of all questions affecting the design, manufacture and service. Design will, therefore, be here understood as including the determination of all the limiting conditions which will permit the product to fulfill the purpose of the design.

Quantity manufacture should not be undertaken when the design is in the experimental stage. Models and samples should first be made and thoroughly tried out to the satisfaction of the designer, the manufac-

turer and the consumer. Such models should embrace the limits of tolerances and thus serve to test the judgment of the designer in establishing such tolerances. The designer is responsible for the proper functioning of the completed product. The manufacturer is responsible for fulfilling the specifications set forth in the design. The designer should make his design and specifications so clear, precise and complete as to preclude any possibility of subsequent misunderstandings as to the exact intention of the design and as to the responsibility for any failure to function. Standards of design should be absolute and not relative, expressed in terms of standard units of measurements and not in terms of relative exactness involving personal opinion and judgment as to the relations existing.

Interchangeability increases in difficulty of attainment in ratio to the complexity of the product, the volume of manufacturing, the continuous operation of equipment, the abnormal and rush conditions in manufacturing accompanying national emergencies, the employment of unskilled and untrained labor and of labor having natural qualifications lower than those desirable for the work in hand. We must recognize that cutting tools lose their edges and exact form through wear, that machines do not continually remain in exact alignment and adjustment, that materials do not run absolutely uniform, and that the human element is a variable one. By reason of a combination of adverse conditions, absolute interchangeability may be impossible of attainment.

The designer must recognize, therefore, that peacetime standards of exactness cannot be maintained under war conditions; cannot be applied to the factory that must expand its facilities many fold over night and deal with untried equipment, processes and personnel.

The problem before the designer of products for quantity manufacture under such conditions is, therefore, to give the manufacturer as wide latitude as possible without embarrassing the functioning of the product, and the suitability of the design to quantity manufacture under war conditions may properly be measured by the extent to which it meets this requirement.

This can best be accomplished by establishing as an essential part of the design a definite system of gaging, including the determination of gaging, and holding points the control of which will govern the functioning of the product, and prescribing tolerances at such points that are possible of attainment under the abnormal conditions of manufacturing under discussion.

It is the practice of some designers and manufacturers to prescribe exact dimensions as between two gage points and to establish no tolerances in connection therewith. The intention is that the manufacturer shall work as near to the absolute measurements as possible. This establishes no standard whatever. It places an unreasonable burden upon the manufacturer, who must assume the responsibility of prescribing the tolerances and instructing his help, permitting them to prescribe the tolerances according to their own judgment. Every gage point should, therefore, have the tolerances clearly defined by the designer, and these tolerances should be acceptable to the manufacturer, and, once accepted, should be adhered to. To prescribe tolerances less than required for proper functioning is uneconomical, since it demands unnecessarily exact operation and enforces extreme inspection practice, with consequent unnecessary rejections and reworkings.

Absolute requirements or measurements are justifiable only as applied to unimportant points or parts about which we are not particular. Where exactness is required tolerances should in all cases be provided in connection with the design.

In addition to providing a workable system of gaging, the designer must give consideration to materials and processes of manufacture. The materials prescribed by him must be such as to be readily obtainable in the broadest possible market under the abnormal conditions existing. It is important that the specifications for materials provide as great latitude as practicable, and that no restrictive requirements be

included which will unnecessarily prevent the use of commercial material. In addition, the materials prescribed must not present any serious difficulties of working nor place an unnecessary limit upon cutting speeds, nor unnecessarily increase the consumption of cutting tools.

The responsibilities of the designer and the manufacturer are further defined by consideration of the problem of inspection. Inspection should be of two kinds and for two purposes:

- (a) *Process Inspection*—The inspection of the work in process to determine the satisfactory performance of the operation.
- (b) *Product Inspection*—The inspection of the completed product to determine its satisfactory functioning qualities and its acceptability for the purpose for which it was designed.

The process inspection is obviously the responsibility of the manufacturer, and is his assurance that his manufacturing facilities are performing according to the standards set.

The product inspection is obviously the responsibility of the organization that is going to use the product, and is at once an inspection of the design and of the manufacture.

If, in connection with the product inspection, the product should be found not to function properly and yet pass a satisfactory process inspection—that is, come within the tolerances laid down by the designer—the responsibility is obviously with the designer, and the adjustment must be between him and the consumer of the product.

## Planning for Munitions Manufacture

BY ARTHUR L. HUMPHREY

Vice-president Westinghouse Air Brake Company,  
Wilmerding, Pa.

The task of organizing a plant to undertake the manufacture of munitions is one of many factors. In fact, organizing involves all of the items in the general list: specifications, materials, designing, limits, gages, inspecting, etc. The general success of the undertaking is dependent upon the perfection of the working organization, upon the selection and installation of adequate machines and other tools, and upon the careful planning of the work, which is not limited to that within the shop alone, but involves a consideration of the market, the purchase and delivery of supplies.

The financing accomplished, the task of organizing comes next in order. It is quite essential that an organization for the manufacture of munitions be built around a nucleus of men who have had experience either in munition-making or in work of an allied character. With such a group as a basis, it is comparatively easy to place new men and ramify the organization into the various departments and divisions, each properly correlated with the other. It should be so arranged that each department acts as a unit within itself and attends to but one thing, such, for instance, as manufacturing the shrapnel time fuse, and that alone.

Many operations in the manufacture of munitions cannot only be as well done by women as by men, but are better done by female help. Therefore, such work should be segregated at every opportunity and the organization be made to include the requisite number of women.

The work to be accomplished is first revealed by the specifications submitted. Conferences between the engineers and shop foremen should be held at frequent intervals as the planning and scheduling progresses in accordance with the results demanded by the specifications.

This problem of organizing is closely bound up with that of equipment. The condition of the machinery market and the urgency of the contract will determine largely the type of machines installed. In every case, where possible, automatic or semi-auto-



matic machines should be given preference in order to get maximum accuracy with a minimum skill requirement on the part of the operators. This reduces materially the losses due to error of the individual. Careful consideration should be given to every detail of the manufacture, a thorough time study made, and the most logical sequence of operations worked up and scheduled before decisions are made as to the types of machines to be installed. Too much stress cannot be placed upon this feature, for any changes it may be necessary to effect after the machines have been ordered will result either in considerable loss or inefficient manufacture. Grouping of the machines should also be gone into very carefully to avoid unnecessary handling between successive operations.

Great emphasis must be placed on the necessity for a well-organized and well-equipped tool room. It is of paramount importance to have an unstinted supply of gages, jigs, machine fixtures and other special tools. They are indispensable to the successful quantity production of accurate work.

Upon the inspection department will depend the proper utilization of the gages supplied by the tool room. A carefully organized inspection force must check the product not only at the end, but at each successive stage of manufacture. The product must be checked not only for variations in dimensions, but for chemical and physical properties as well. The personnel of the inspection force is of the utmost importance, for it is quite unwise to give the power of rejection to a group of uninformed inspectors who are lacking in judgment. And if power to reject be withheld, the inspection force might well be entirely dispensed with.

## Materials for Munitions

BY C. B. NOLTE

Robert W. Hunt & Co., Chicago

Since, strictly speaking, munitions include all supplies and equipment necessary in war, with the exception of men and money, only the characteristics of the more important materials can be considered within the limits of this paper.

The gun proper of the usual field gun is subjected to a suddenly applied pressure of from about 35,000 to 40,000 lb. per square inch and is generally made of nickel steel of over 90,000 lb. per square inch tensile strength, 60,000 lb. per square inch elastic limit, and an elongation in 2 in. of 18 per cent. Rigid inspection and tests of this material are necessary before it is worked. The artillery wheels, springs, hollow axles, and recoil cylinders of field guns are made of ordinary materials used at automobile-wheel factories and forge plants.

The two principal types of projectiles are the shrapnel and high-explosive shell. The shrapnel body is not intended to break or explode when subjected to an internal pressure of about 20,000 lb. (the force exerted when the charge leaves the shrapnel), and is made of steel with a yield point of from 80,000 to 100,000 lb. per square inch. Further, American shrapnel must, when finally treated, give a tensile strength of, in some types, 110,000 and others 120,000 lb. per square inch, with an elastic limit of 80,000 lb. and 90,000 lb. per square inch, elongation in 2 in. of 15 and 16 per cent, and reduction in area of 40 and 45 per cent, respectively. Steel for this purpose is furnished by the steel mills, and contains carbon from about 0.35 per cent to 0.45 per cent, manganese 0.50 to 0.80 per cent, phosphorus and sulphur not over 0.04 per cent each, chromium 0.70 to 1.20 per cent, vanadium 0.12 to 0.24 per cent.

Shrapnel steel, as produced by the large steel mills in this country, is furnished in three different forms: rough-turned bars, forgings and rolled-steel rounds. The latter form has been used with considerable success and exceedingly rapid production.

The ordinary shrapnel fuse is made of several brass parts, the material for which can be produced

by modern brass foundries. The usual composition of this material is about 59 to 61 per cent copper, 37 to 39 per cent zinc, and about 2 per cent lead, resulting in a tensile strength of about 45,000 lb. per square inch, elastic limit of 27,000 lb. per square inch, and 30 per cent elongation in 2 in. The fuse bodies and caps are generally forged, whereas the timing rings and other parts can be cut from brass tubes. The brass cartridge cases which hold the propelling charge for the shrapnel are drawn from brass disks cut from bars rolled by the various brass rolling mills. There is nothing unusual in the specifications for cartridge-case material, copper varying from 66 to 73 per cent, according to different purchasers' specifications, with zinc from 27 to 34 per cent, and with a tensile strength from 43,000 lb. to 54,000 lb. per square inch and an elongation of from 28 to 32 per cent in 2 in. The usual specification allows a range of 3 per cent in the copper and zinc contents, for example, 69 to 72 per cent copper and 28 to 31 per cent zinc.

The high-explosive shell is made of steel and is intended to break into a large number of pieces upon impact and explosion. It is unusually forged from steel rounds, billets and cast ingots, with carbon from 0.40 to 0.55 per cent, manganese 0.40 per cent to 1.00 per cent, phosphorus and sulphur not over 0.04 on 0.06 per cent each, and silicon from 0.18 to 0.30 per cent. Some of the steel for this purpose also contains nickel not to exceed 0.50 per cent and copper not to exceed 0.10 per cent.

The first problem in the procuring of shrapnel, high-explosive shells, fuses and cartridge cases is the delivery of suitable raw material. Care must be taken, therefore, to secure steel and brass of the proper chemical composition and physical characteristics. In addition to a careful study and understanding of the specifications and drawings, one of the most effective and economical means of obtaining the desired material rapidly and without excessive loss has been found to be by inspection of the material at the rolling mills, before it is shipped to the finishing plants, by an experienced and trained organization.

## Limits and Tolerances in Munitions Manufacture

BY A. W. ERDMAN

Schenectady, N. Y.

Most mechanical men who have had recent experience with munitions manufacture will agree that their troubles have principally been caused by such factors as incomplete or inconsistent drawings and specifications, and lack of mechanical judgment on the part of inspectors in interpreting the drawings and specifications and in the use of limit gages.

The average munitions drawing is fairly open to criticism and leaves much to be desired in the way of clearness and consistency. The following defects are often encountered:

(a) Flat dimensions without tolerances. (b) Dimensions with one tolerance only, either plus or minus. (c) Overlapping tolerances on two parts which assemble together. (d) The sum of the tolerances on intermediate dimensions are not in agreement with the tolerances on the over-all dimension. (e) No limits are specified as to permissible eccentricity between concentric cylindrical surfaces, or between two parts which assemble together. (f) In the case of screw threads on two parts which assemble together, but where interchangeability is not required, no specifications are given as to the nature of the fit.

Defects *a* and *b* can be readily remedied by establishing an invariable rule that all dimensions must be the mean dimensions with equal plus and minus tolerances.

Defect *c* usually occurs in the tolerances for external and internal threads on two parts which assemble together, and is occasioned by losing sight of the fact that the maximum external thread must be slightly smaller in diameter than the minimum internal thread, in order that these extremes may assemble properly.



Defect *d* can best be avoided by establishing the invariable rule that all dimensions in the same direction must start from a common reference line.

Defect *e* is a fruitful source of trouble to the munitions maker, and consequently in all cases where close concentricity of cylindrical surfaces is essential, definite limits of eccentricity should be specified on the drawings.

Defect *f* can conveniently be illustrated by considering the fit of a nose piece or base plug external thread, in the internal thread in a shell. In this case the nose piece or base plug virtually becomes an integral part of the shell after it has been assembled. All that is required is that the nose piece or base plug should screw into the shell easily, without too much looseness. Liberal tolerances are in order, but the dimensions and tolerances must be properly assigned in order to avoid the possibility of too much looseness. This can readily be accomplished by letting them overlap to some extent, which will result in producing some nose pieces and base plugs which will be too large to enter shells having minimum threads. This apparent difficulty is overcome by grading the nose pieces and base plugs, as, for instance, small, mean and large. A mark can also be put on a shell at the time it is gaged which will indicate to the assembler which grade of nose piece and base plug to use.

#### Relation of Tolerances to Weight

Perhaps the most striking defect, in shell drawings particularly, is the discrepancy between the tolerance specified for the weight of the shell and the variations in weight of the shell from making one to maximum external and minimum internal dimensions, and another to minimum external and maximum internal dimensions. As a rule, shell drawings and specifications allow a variation in weight of plus and minus 1 per cent of the mean weight for the smaller sizes and less for the larger sizes, whereas the extreme dimension tolerances would permit two or three times as much variation in weight. Furthermore, no dependence can be placed on the assumption that a shell machined to the mean dimensions will have the mean weight specified on the drawing.

From the standpoint of ballistics uniformity in weight of shell is highly desirable, and consequently close weight tolerances are to be expected; but the drawings and specifications should sound a clear note of warning so as to prevent a manufacturer from proceeding on the assumption that the dimension tolerances can be used indiscriminately.

#### Thread Tolerances

Perhaps the most difficult operation in munitions manufacture is the cutting of internal and external threads within close limits. As a matter of experience, it is quite difficult to maintain the size of the United States standard thread within close limits. The requirement that this form of thread shall fit on the top and bottom, as well as on the all-important angle, is the chief source of trouble. Most of the fitting occurs at the top and bottom of the thread, rather than on the angle. It is practically impossible to avoid this condition since the tops of the threads on a tap wear away very quickly and therefore the tap does not continue to cut internal threads of full depth. This defect is quite commonly overcome by making the diameter of taps slightly larger than standard, which affords a clearance at the top and bottom for the external thread. This necessary and customary practice should receive official sanction in the drawings and specifications for munitions, and limits for these clearances should be specified.

#### Individual Judgment of Inspectors

Next in importance as affecting the manufacture of munitions is the question of mechanical judgment in interpreting the drawings and specifications on the part of the inspectors, and also in regard to the proper use of limit gages. Many inspectors have not these qualifications. The obvious solution of this difficulty is to make the drawings and specifications so clear and comprehensive that men with little mechanical ex-

perience can become efficient inspectors. The specifications should clearly specify such details as kind and quality of finish for all surfaces, whether by turning or grinding, and if by turning whether the tool marks must be removed by filing. Some surfaces can, in the interest of maximum production, be left semi-finished, and the specifications should in such cases so state. In general this plan can be made most effective by basing the requirement of the specifications on actual results obtainable with modern machine tools, and all unnecessary refinements should be eliminated.

#### Machine-Tool Limitations

The limits of accuracy attainable on machine tools must be taken into consideration in determining how limit gages should be used. The screw thread affords a good illustration of this point. In a part where a threaded hole goes entirely through the part, it is not very difficult to cut threads of uniform diameter in the sense that the thread is uniform throughout its length and that it does not taper. In bottom-tapping a shallow hole, however, or in cutting a short external thread, both are apt to taper slightly, or at least the first thread or two will be thin. In the first case it is perfectly proper to require that the maximum thread gage shall not enter at all; but the second case manifestly demands different treatment. A rational rule would be to allow the minimum thread gage to screw in one-third or one-half the depth of a shallow not-through hole, and the same allowance should be made in the case of a short external thread. This proposition should be judged from the standpoint of utility rather than idealism, particularly when one stops to consider that the mechanic can, by cutting the external thread in the proper direction, make these inaccuracies actually balance each other.

### Importance of Intelligent Inspection in Manufacture

BY E. T. WALSH

Canadian Car & Foundry Company, New York

Specifications on a large contract for ammunition for the Russian Government were so drawn as to leave much to be interpreted by the inspector, who was rarely qualified to pass intelligently upon the point at issue. The following extracts, copied from the specifications, will serve as examples.

"There shall be no scratches, slivers or cuts on these parts."

"If, independently of the above, in order to ascertain the qualities . . . the Receiver shall deem it necessary to make . . . other experiments, the factory shall give him all necessary means for making such tests."

"For the measuring and verification of the projectiles, the factory is under obligation to furnish a sufficiently vast, light, dry and warm room and place at full disposition of the Receiver as well as furnish cupboards for the keeping of verifying instruments, scales of sufficient sensitiveness, electric lights of sufficient energy, for the examination of projectiles and gross power."

"For the measuring of the projectiles, the factory shall furnish the Receiver, for his exclusive use, all verifying working instruments . . . prepared according to the instructions, as well as according to the indications of the Artillery Receiver."

" . . . the finish of these surfaces must be brought to such a degree as is obtainable when working with a tool."

The slightest scratch or tool mark was soon magnified into a cause for rejection. Under the clause governing the finish of the shell, the inspectors were soon demanding a finish that could only be obtained by buffing. The manufacturers had no redress, because there were no standards of finish established. There was no set of standard gages, nor was there anyone in authority to whom the contractor could appeal and whose decision was final.

To avoid such difficulties in the future, the writer offers the following suggestions:

Drawings should be checked and re-checked until the possibility of error has been reduced to a minimum. Tolerances should be decided upon that will allow the greatest leeway compatible with good work.

Every effort should be made to make the specifications simple, clear, explicit and absolute. They should leave nothing open to the discretion of the inspectors. The specifications should describe the gages to be used and how to use them.

The gages used should be as few as will check up the product in all of the important features. What these gaging points and their limits should be should be determined by competent military engineers, working with the idea of getting a product that will meet all requirements and still be practicable, so that the quality produced will not be curtailed by unnecessary refinements. Where exactness is not necessary there should be no holding down to ridiculously close limits.

Corps of inspectors should be enlisted from our numerous manufacturing plants and thoroughly drilled in the use of gages and the meaning and intent of the specifications, with particular stress laid upon the fact that inspection should be made with the idea of accepting as many as possible, rather than a high count of rejections.

Each manufacturer should be supplied with a set of correct sample gages, with their masters and grand master, by which the working gages should be made and checked.

An approved sample of the product to be made should be furnished to each factory, to be used for comparing the same with the regular product when necessary. These samples should be official, and product equal to samples should be accepted without question.

It is most important to have a bureau composed of qualified engineers to interpret specifications and render final decisions on all points that may arise. Manufacturers should have the right of appeal to this board and its unbiased opinion. At this bureau should be kept on view officially accepted samples of all parts in the various stages of manufacture, to be referred to when making decisions.

## Special Machines for Munitions Manufacture

BY H. V. HAIGHT

Chief engineer Canadian Ingersoll-Rand Company,  
Sherbrooke, Que.

When undertaking the first contract for shrapnel our firm had a machine shop which could be converted to shrapnel production and an experienced working force. As shrapnel production increased and as the regular work picked up, additional machines were purchased or made, until all the regular tools had been withdrawn from shrapnel production.

The following notes relate to the principal operations on the shrapnel and the machines which our experience shows were the best to use. The accompanying drawings show the shell at several stages and the numbers indicate the operations described below.

1. *Cut off open ends.* Standard 4-in. cutting-off machines with air-expanding mandrels. Production 900 in 8 hours. On the regular machines the air mandrel is preferred to the universal chucks, as it is much quicker and costs less to keep in repair.

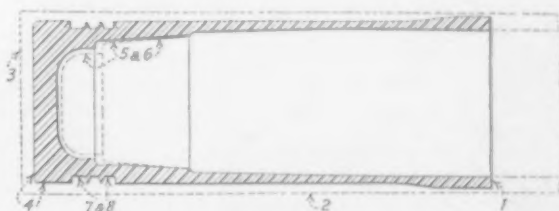
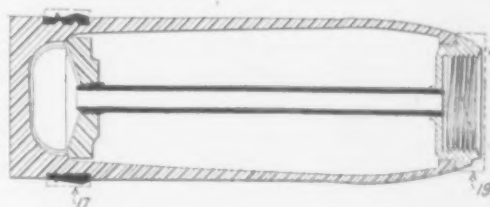
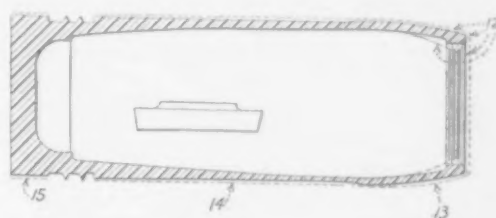
2. *Rough turn body.* We used at first heavy 24-in. engine lathes, 24-in. Gisholts, Lo-swing lathes, etc., with fair results, but we are now using single purpose lathes of our own make which produce more work and are much simpler to keep in repair. These lathes have cast-iron spindles, 6½ in. diameter in the front bearing, with driving gear integral with the spindle. They have tight and loose pulleys on the back-gear shaft, thus eliminating countershafts with their troubles. The feed is by belt. The work is chucked on an air-expanding mandrel and turned with a bar cam to give the necessary enlargement at the open end of the shell for the subsequent bottling.

3. *Rough face base.* We have used 36-in. engine lathes, 42-in. and 60-in. vertical boring mills, 36-in. planers, 30-in. planer-type millers, etc., on this work, but have abandoned them all for 4-in. standard cutting-off machines. On milling machines the tool upkeep is

too great, on planers the work is hard to hold, on planers and boring mills the intermittent cut is hard on the machines and on all except the cutting-off machines, the labor cost and upkeep are too high. On the cutting-off machines the regular universal chuck is omitted and a plain hinged chuck used, as a universal chuck will not stand shell work. The regular cutting-off tool blocks are replaced with a tool block to hold a facing tool. Each man runs two of these machines.

4. *Finish face and turn base.* Standard 16-in. lathes, with air collet chucks supported by steady rests, give satisfactory service on this operation. Only hand feeds are used.

5 and 6. *Rough and finish bore.* It has been found best to rough-bore on one machine and finish on another. Turrets are not desirable on shell work, where they can be easily avoided. We used turret lathes of a well-known make on this work, but they proved light and required considerable repair. They were eventually replaced by special boring lathes of our own make, in which the work is held inside the spindle by an air collet chuck. Two different feed mechanisms are in successful use,



Index of Operations on Shrapnel Shell. The numbers refer to the corresponding paragraphs in the article

one a central rack with power feed and air return, the other a crank and "Scotch Yoke" with hand feed. We built a double spindle lathe for this work but it proved a failure.

7. *Rough band groove.* This work is being done on cutting-off machines and also on lathes of our own make. In both cases the work is held in push-out air collet chucks. No longitudinal feed is required and only a hand cross feed.

8. *Finish band groove.* This consists of undercutting the edges and forming the waved ribs. Potter and Johnston automatics are in successful use and stand up well. It has been found, however, that a man can do more work on one machine than he can on two or three, so the automatic feature is of no use on this work. Regular 20-in. engine lathes with special fixtures, and simple lathes of our own make with similar special fixtures, are now preferred, as they produce rather more work.

9. *Harden.* We used at first muffle furnaces, with cast-iron pot muffles holding eight shells, but now we use large semi-muffle furnaces, holding 50 shells. We used pyrometers at first, but now the operators go by the color. An "irite" pyrometer is used to train new men.

10. *Bottle.* The noses of the shells formerly were heated by dipping in a pot of lead. The present method is to heat in an oil furnace having holes through which the shells project into the furnace. A water-jacketed

front was tried, but fire brick with iron thimbles has been found better. The bottling presses used at first were air presses which we made ourselves from drill sharpeners, but the present practice is to use geared crank presses which are purchased. After bottling, the shell is put back in a similar furnace to anneal the nose.

11. *Shot blast.* The regular foundry sand blast was used at first, but present practice is to use a small shot-blast machine of our own make. This has two jets, one of which cleans the band groove and the other the base.

12. *Turn and thread nose.* This requires a fairly heavy turret lathe, and we are using both 24-in. engine lathes, and also single-purpose lathes of our own make, both of which are equipped with turrets. We prefer the latter lathes, as they take the work inside the spindle and eliminate the steady rest. Air collet chucks are used. This is the only operation on the shrapnel where a turret is used. It requires five holes of the turret.

13. *Grind nose and (14) Grind body.* Standard grinders, slightly modified for the wide wheels used on shell work, give satisfactory results, as do also special purchased shell grinders. In most other cases, the shell manufacturers themselves have built more suitable machines than either standard or special machines built by the machine tool manufacturers.

15. *Grind base.* Simple machines of our own make give good results.

16. *Press copper band.* Two different hydraulic hand presses, both designed and built by other shell manufacturers, are giving good results on this work.

17. *Turn band.* A heavy engine lathe with special equipment and an air collet chuck gives good results, but costs more money than a very good special band turning lathe, built by another shell manufacturer.

18. *Fill.* This is nearly all home-made equipment and hardly requires detailed description here.

19. *Turn socket.* A 16-in. engine lathe is heavy enough for this. A clutch on the back gear is convenient. A turret is not desirable.

20. *Paint.* We use with satisfaction a small portable machine of our own make, driven by a 1/6 hp. motor.

The foregoing does not cover the use of purchased single-purpose lathes, of which there are now a large number of designs on the market, but from experience with three or four types of these on 8-in. shells, it appears that they should give good results on shrapnel work. The features they should have would be a large spindle, 4-in. to 5-in. diameter, with hole at least 1 3/16-in., strong drive and feed, a good feed-engaging clutch, or better still a drop worm. The countershaft should have tight and loose pulleys, though the use of air chucks will largely eliminate countershaft troubles. It is better, however, to have tight and loose pulleys on the headstock and eliminate the counter-shafts, which will reduce the cost of belting. A special point for consideration is the depth of dovetail on the carriage, for the cross slide. This should be 1 1/4 in. to 1 1/2 in. deep. There are at least two of these lathes on the market with dovetail 3/8 in. to 1/2 in. deep, and a taper gib. The small surface is not sufficient to resist the side strain of a cam, which is used on two of the operations, and the height is not sufficient to use a straight gib with set screws. It is usually necessary to replace the regular cross slide with a special cross slide, and when doing so it is much simpler to use a straight gib with set screws, rather than a taper gib.

To sum up, a manufacturer starting to make shrapnel would be well advised to consider the following suggestions:

(a) Do simple operations and use simple machines. Do not try to do several operations at one setting, and do not buy automatics, turret lathes or other complicated machines.

(b) A safe and satisfactory plan is to get a quick start at some fraction of full intended capacity and to add equipment and build up production after experience has been gained.

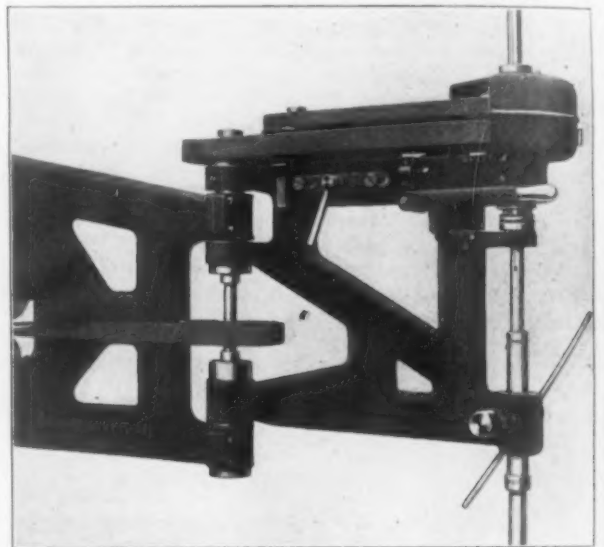
(c) Suitable purchased machines for making a quick start would be regular cutting-off machines, regular engine lathes 16-in. to 24-in. swing, simple single-purpose lathes, regular or special grinders and such special machines as bottling presses, band presses and band lathes.

(d) It will be worth while to consider the organization of a lathe building department to supply many of the machines required to increase the capacity. This department might also undertake the making of air chucks, waving devices and other special attachments, and thus relieve the tool room. Later, this department would become a repair department, which is an important and busy department when work is being pushed day and night.

## Drilling Machine Tapping Attachment

The Hammond Mfg. Company, Cleveland, has recently brought out a tapping attachment to be applied to its high-speed, ball-bearing, swinging-arm radial drilling machine. There are two pulleys in the head, one for driving and one for reversing, both driven by open endless chain belts which have an adjustment for tension.

The spindle drive is through a double-cone friction, which is normally held in engagement with the lower or driving pulley by three coil springs. When the tap has been advanced to the desired depth the double-



This Tapping Attachment for a Swinging Arm Radial Drilling Machine Is Driven by a Double-Cone Friction, the Reversal Being Accomplished by Pressing Down on the Horizontal Lever Under the Head

cone friction is engaged with the upper or reverse pulley by pressing down on the horizontal lever shown underneath the head. The tap is then backed out at a 50 per cent increased speed. All parts of the attachment run on annular ball bearings. It is stated that, because of the friction drive, the attachment operates without shock and that high tap speeds may be maintained.

The attachment has a capacity up to 1/2-in. standard taps in cast iron. The machine has a drilling and tapping radius of 48 in. and up to within 12 in. of the column.

## Promoting Engineering Publicity

At a meeting of the Brooklyn Engineers' Club, Brooklyn, N. Y., April 26, C. E. Drayer, secretary of the Cleveland Engineering Society, Cleveland, and also of the National Committee on Engineering Co-operation, delivered an address on "Co-operation Between Local Engineering Societies and the Newspapers to Promote Intelligent Public Opinion." Lantern slides showing what has been accomplished in working with the newspapers in Cleveland were shown and explained in a very interesting way. The Cleveland society for several years has carried on a campaign to promote the intelligent consideration of engineering problems, particularly those relating to the progress of the city, and very encouraging results have been obtained. Keen interest was shown in the subject of Mr. Drayer's address, which was discussed at length after he concluded.



# Making Munitions to European Standards

## Manufacture of Both Wooden and Steel Vessels Will Be Pushed—Plans for Tin-Plate Conservation and Government Control of Coal

WASHINGTON, May 8, 1917.—With less than half the debate that usually accompanies the passage of the annual army appropriation bill the House, during the past week, rushed through the great war budget measure carrying \$2,827,000,000, an increase of more than \$125,000,000 over appropriations recommended by the House Committee. The greater part of this additional sum was voted into the bill by the House to provide pay for enlisted men at the rate of \$1 instead of 50 cents per day. The budget bill will be given right of way in the Senate and it is expected will be signed by the President within the next ten days. All the appropriations are made immediately available and the disbursement of money is left largely discretionary with the executive officials.

The bill, as passed by the House, carries the huge sum of \$1,250,303,554 for ordnance and seacoast defense material, including small arms, mountain and field guns, siege cannon, submarine mines and nets, naval batteries, torpedoes and appliances, powder, armored motor cars, ordnance stores, etc. The chief items are summarized as follows: War ordnance, \$377,368,700; seacoast defense material, including batteries, etc., \$584,181,330; material for insular fortifications, including batteries, etc., \$29,910,000; fortifications for the Panama Canal, \$4,152,500; continuing contracts for ordnance to be appropriated for hereafter, \$56,550,000; naval ordnance and ordnance stores, \$198,121,024.

### Munitions of European Standards

The Council of National Defense is now giving serious consideration to an urgent recommendation by Howard E. Coffin, of the Advisory Committee, concerning the munitions to be supplied for the use of the American army which, sooner or later, will go to France. Mr. Coffin urges that this army be equipped and trained in the use of munitions made exclusively in conformity with European standards rather than with those used in the United States army. The adoption of this suggestion, Mr. Coffin believes, will solve a problem of the greatest importance to the numerous munitions plants in this country whose foreign contracts are now expiring and who will be obliged to scrap a large part of their equipment, as it is not suited to the production of material in accordance with United States army standards. In a statement issued here Mr. Coffin says:

If our army is to be of service in Europe it must use European standards. To carry our standards abroad would create endless confusion. We would have to establish factories abroad. Allied contracts are lapsing here now, and we can use the output of our own factories equipped to manufacture according to European specifications. We face entry into the war with the great advantage of having numerous factories working on war contracts and with thousands of skilled men available. This is a tremendous start. Had we entered the war two years ago we would have had to do what England has done—take over our factories.

The Government will be able to produce its supplies with as little diversion of other factories to munitions manufacture as possible. Even those to be changed over will not lose their normal percentage, as we hope to change them by percentage and let them continue to carry on their usual business as well as their war business. Otherwise we would cripple industry. Factories can supply the Government with 25 to 50 per cent of their output and continue their organizations.

### Rifles in Plenty, but Not Big Guns

Mr. Coffin added that the present production of war material in the United States is being carried on at a

phenomenal rate that is entirely adequate to any demands the Government may make. Rifles are being turned out at the rate of 17,000 to 20,000 a day and small arms ammunition is being manufactured faster than all the standing armies of the world can use it. Machine guns can be supplied as fast as they are needed. In only one particular is there any deficiency in equipment, namely, that for the production of big guns. The Allies are now taking the lion's share of these weapons and it will be necessary to increase the capacity for their manufacture to meet the demands of the War Department for siege cannon, seacoast defense rifles and naval guns.

The Ordnance Bureau of the War Department has taken up the question of providing motor traction for field batteries. This problem has been worked out in both French and German armies, but it is believed that improvements can be made and to this end the Secretary of War has appointed a board to meet in this city at an early date to consider designs for field battery tractors. The board is composed of Maj. Lucian B. Moody, Ordnance Department; Maj. D. T. Moore, general staff; Capt. Webster A. Capron, Fifth Field Artillery, and George W. Dunham, Washington. The board will have before it a large amount of material gathered by American military observers in Europe supplemented by suggestions from American experts.

### Submarine Toll Exaggerated

The impressive figures showing an apparent marked increase in the efficiency of the German submarines during the month of April recently made public by Secretary of the Interior Lane has had the effect of stimulating the activity of the United States Shipping Board in hastening preparations for the construction of the big fleet of wood and steel ships to be used in carrying war material and food supplies to the Allies. While the gravity of the situation is universally conceded it is believed that Secretary Lane figures showing aggregate sinkings of 400,000 tons in a single week are greatly exaggerated. The Secretary is believed to have been misled by figures representing a much longer period than one week. Conversely, it is believed that the figures given out by certain British authorities fixing the world's output of shipping in 1916 to 2,000,000 tons are much below the mark. While the exact figures are not available because of the secrecy maintained, it is a well known fact that several years ago the merchant output of the world's shipyards exceeded 3,300,000 tons per annum. While it goes without saying that many yards have devoted a large part of their facilities to naval work, it is also true that never in the history of the world has the construction of merchant ships been given such an impetus as during the past eighteen months. In connection with the general subject of the increased effectiveness of the German submarine the official figures covering the export trade of the United States in March, demonstrating its unprecedented proportions, are certainly highly significant.

### The Standard Wooden Vessel

The Shipping Board announces that for the purpose of "allaying uncertainty among shipbuilders who expect to take contracts for vessels of the wooden-ship fleet" the specifications for a standard ship are being rushed with all speed and will be ready in a few days.

The standard vessel will be about 280 ft. overall with a 24-ft. depth of hold and with two full decks and will be capable of developing about 1500 hp. A problem that has occasioned some delay in the designing of these ships is that of providing bulkheads to prevent the sinking of these ships by torpedoes or mines. It has been fully demonstrated that a sufficient number of well placed bulkheads constitute a great safeguard in this respect, as has been amply evidenced in the case of petroleum tankers that have been torpedoed but not sunk. The Shipping Board has conferred with several experts among the members of the European war missions now visiting this country and valuable suggestions have been received. As it is proposed to arm these ships, naval ordnance officers have also conferred with the board, and it is believed that the vessels of the new fleet will show extraordinary efficiency not only as fairly swift cargo carriers, but also in their capacity to protect themselves against submarines and to save their cargoes if torpedoed. Hundreds of requests have been received from wooden shipbuilders in various parts of the country for plans and specifications of the new vessels and many builders express their willingness to guarantee deliveries in unprecedentedly short periods.

#### More Steel Vessel Capacity

The Shipping Board is receiving very gratifying assurances from builders of steel vessels as to their ability to contribute to the projected fleet of cargo carriers. At the outset it was thought that this fleet would be limited strictly to wooden vessels because of existing engagements of the steel shipbuilders, but there has been a very substantial expansion in the facilities for steel construction in existing yards, and in addition new plants are being established with a view to filling the extraordinary demand, which, it is believed, will furnish work for all possible yards for several years to come. The projectors of the new steel shipbuilding plants confidently count upon a big revival in the American merchant marine after the war and believe that a customer can be found for every ship that can be built within the next five years. The general tendency in the new yards and in the extensions to the old yards will be toward the construction of standardized steel ships which can not only be built more rapidly than those constructed on special designs, but will admit of the use of material which can be fabricated and otherwise advanced in condition at the steel works before shipment to the yards.

#### Seized Ships Soon Available

Estimates received by the Shipping Board indicate that 71 German and Austrian merchant ships seized by the Government will be repaired and ready for commission within five months unless concealed damage is discovered. These ships total 535,722 gross tons and with modifications that can be made while necessary repairs are in progress will make ideal cargo carriers. At least one-third of these ships, including the smaller ones, can be ready for service in four months and a few of them in 90 days. The work of disabling these vessels by their German and Austrian crews, while ingeniously planned, has proven less effective than was supposed. Many parts of engines and other machinery destroyed or thrown overboard in the expectation that duplicates would have to be brought from Europe can speedily be supplied in this country.

#### Railroad Co-operation a Prime Factor

Extraordinary measures have been adopted to secure the co-operation of the railroads in the management of the war, both in this country and abroad. Large quantities of additional rolling stock are now needed by the Allies, especially in France, and the entire railroad system of Russia calls for reorganization. For this latter task the Government is about to send to Petrograd a commission of four railroad experts, including John F.

Stevens, New York, formerly chief engineer of the Panama Canal Commission; John C. Greiner, Baltimore, consulting engineer; Henry Miller, formerly president of the Wabash Railroad, and an official, not yet named, of the Burlington system. While these experts will probably accompany the political commission, headed by Elihu Root, soon to go to Russia, their work will be carried on independently.

It is a part of the plan of the general railroad board co-operating with the Council of National Defense that as large a part as possible of current output of locomotive and car works be made available for shipment to Europe, also that the rails called for by the Entente Allies be given preference in rollings at the mills.

#### Regulating Explosive Manufacture

The Administration has succeeded in inducing the House Committee on Mines and Mining to report a substitute bill "to prohibit the manufacture, distribution, storage, use and possession of explosives in time of war or during national emergency." The original bill merely gave the President power to regulate the manufacture and sale of explosives, but the substitute measure makes it unlawful to manufacture, distribute, store, use or possess smokeless powder, explosives, blasting supplies, and ingredients thereof, unless such manufacture, distribution, storage, use, or possession is in compliance with the provisions of, for the purpose set out in, and in the manner provided by, the regulations authorized by the provisions of this act. The President is authorized to promulgate regulations for the enforcement of the law, the details of which will be in the hands of the Bureau of Mines.

#### Government Control of Coal

The Council of National Defense is considering the advisability of establishing more direct governmental control over the coal industry to enable the United States to co-operate with the Allies and especially with France in obtaining for them necessary supplies. There is an acute coal shortage in France, which cannot be supplied, notwithstanding the fact that the French Government has large contracts for coal in the United States. These contracts cannot be filled because of lack of railroad and shipping facilities. F. S. Peabody, Chicago, has been employed by the Council of National Defense to investigate the situation and to make recommendations. At present France is securing considerable quantities of coal from England and it is pointed out that if American coal can be substituted a number of British ships can be released for other very necessary service.

#### Tin-Plate Conservation

The exact form to be taken by the embargo legislation desired by the Administration has not yet been determined. In the espionage bill, as passed by the Senate, an embargo provision has been included authorizing the President to prohibit the export of tin plate or tin containers of any kind "whenever the United States is without an adequate supply." In whatever form the embargo legislation is finally enacted it is now believed its chief object will be to prevent supplies from reaching Germany rather than to prohibit the exportation of goods needed in this country, although the President will be granted full discretion for the latter purpose.

A permanent committee appointed by Secretary of Commerce Redfield and Secretary of Agriculture Houston to conserve the supply of tin plate and tin cans for the use of food packers has reached an agreement under which certain restrictions have been voluntarily accepted as the result of which all interests concerned will substitute paper, fiber, glass and other containers for tin wherever possible. This committee includes:

J. I. Andrews, American Sheet & Tin Plate Company; H. W. Phelps, American Can Company; W. F. Burrows, Libby, McNeill & Libby; Henry Burden, president American Canners' Association; J. H. McLaurin, Southern Wholesale Grocers' Association; Theodore E. Whitmarsh, National Wholesale Grocers' Association; Dr. Carl Alsberg, chief of the Bureau of Chemistry, and Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce.

#### Daylight Saving

The adoption of the so-called daylight saving plan as a war measure was urged upon the Senate Committee on Interstate Commerce, May 4, by a delegation of manufacturers and business men who asked the committee to report favorably the measure introduced by Senator Calder of New York. Under this bill clocks would be set ahead one hour during the spring and summer months. The committee was told that the plan has worked extremely well in Detroit and other cities, where it has materially increased the efficiency of labor. It was suggested to the committee that in connection with the movement to increase the raising of food stuffs the daylight saving plan would enable men working in the factories to spend an extra hour each day attending small gardens with results which, in the aggregate, would be of great consequence.

W. L. C.

#### War Trade Briefs

During the past three years the Quickwork Company, successor to H. Collier Smith, 807-815 Scotten Avenue, Detroit, has been supplying rotary shears to the various Navy yards. The Government, in view of contracts now being executed, has assigned K. J. O'Leary, general superintendent of the company (who enlisted in the Naval Reserve several years ago) to duty in the Quickwork factory, on the ground he can best serve his country in his present civil position.

The Matthews Steel Company, Newark, N. J., announces that it will guarantee any of its employees who enlist in the Federal service resumption of their positions at the end of the war.

"Business Must Go On" is the keynote of addresses before associations and conventions of electrical men by representatives of the Society for Electrical Development, New York. James M. Wakeman, general manager, H. W. Alexander, director of publicity, and George W. Hill, of the field staff, have made a number of addresses at such gatherings in recent weeks, in furtherance of the society's efforts to keep business moving.

An ordnance manufacturer in western Pennsylvania is reported to have taken Government contracts amounting to \$9,000,000 and which will require considerable additions to plant.

Orders have been issued from the headquarters of the Eastern Department, U. S. Army, Governors Island, New York, for the detachment of 41 men from the Second Connecticut Infantry. These men all belong to Waterbury companies and will at once resume work at the Scovill Mfg. Company plant. They have been detached for the convenience of the Government and will still be under Government regulations.

The Lebanon Steel Foundry, Lebanon, Pa., has received a large order from the Government for steel castings and gun carriages. The contracts were awarded under competitive bids and will keep the plant busy for a considerable time.

Members of the Employers' Association of Pittsburgh have unanimously ratified the action of its directors in tendering to the United States Government the use of their plants. The association, of which A. L. Humphrey is president and W. F. Long manager, has a membership of several hundred important industrial

plants in the Pittsburgh district, which have capital invested of \$500,000,000 and employ upward of 75,000 men. Many of the plants are well equipped for making munitions.

#### A Zinc Committee Fixes Government Prices

The Zinc Committee of the Advisory Commission of the Council of National Defense, appointed by B. M. Baruch, in charge of raw materials for the Advisory Commission, is as follows:

Edgar Palmer (chairman), president New Jersey Zinc Company.

Charles W. Baker, president American Zinc, Lead & Smelting Company.

Sidney J. Jennings, vice-president U. S. Smelting, Refining & Mining Company.

Thomas F. Noon, president Illinois Zinc Company.

M. Bruce MacKelvie, president Butte & Superior Mining Company.

Charles T. Orr, president Bertha A. Mining Company.

C. F. Kelley, vice-president Anaconda Copper Mining Company.

A. B. Cobb (secretary), vice-president New Jersey Zinc Company.

The purpose of this committee is to insure the Government its supply of zinc during the war and to secure the co-operation of the zinc producers of the country in taking care of whatever needs may arise. The following prices for slab zinc have been fixed with Government approval:

Grade A.....	11½c. per lb.
Grade B.....	11c. per lb.
Grade C.....	9c. per lb.

The price of grade C is protected against decline.

The above prices are in carload lots with freight allowed to New York delivery rate points. Earlier in the war grade A metal sold as high as 42c. per lb., and the market price at the time of making the prices above was about 18c. per lb. Grade C metal has sold as high as 27½c. per lb., and the market price at the time of making these prices was 9½c. per lb.

Letters have been sent to zinc producers throughout the country asking the amounts they are willing to supply to the Government.

#### Railroad Men Postpone Association Conventions

Following the decision of the American Railway Master Mechanics Association and the Master Car Builders Association, on April 30, to forego the Atlantic City conventions this year and a like stand taken by the electric railroad interests, which have met annually in October at Atlantic City, the fourteenth annual convention of the Railway Storekeepers' Association which was scheduled to take place May 21 to 23 at Chicago has been indefinitely postponed. W. A. Summerhays, Illinois Central Railroad, president of the association, in his letter of announcement, says:

"We are passing through a time of national peril, and our President has called on each individual to do his allotted task with good will and to the best of his ability. On no one line of endeavor does the nation depend at this time more than on the transportation companies, and it is hard to realize how any individual will have better opportunity to perform service for his country than falls to the lot of railroad men.

"In considering the work to be done by associations of railroad officers in getting together at conventions to compare notes and discuss methods, the first thought is usually that under these extraordinary conditions even more good could be accomplished than ordinarily. On second thought, however, it is readily to be seen that the place for each railroad employee is at home, attending strictly to his individual duties and there is no time for him to be absent even for a few days to attend a convention."



# Electric Process for Small Steel Castings\*

## Reasons for Abandoning Other Processes —"Reversed Duplexing," or the Acid and Basic Furnaces Worked in Conjunction

BY R. F. FLINTERMANN

**B**Y "small steel castings" is meant castings used for the most part for automobile trucks, tractors, light machinery parts and for other purposes where the size and shape of the part, its lightness of section and difficulty of production preclude its being made practically in open-hearth foundries. The castings we have been manufacturing will run from ½ lb. up to 250 or 300 lb. We do make some running up to 2000 lb., but the average weight is about 20 lb.

Our first method was the crucible furnace. This was chosen because of the low first cost of installation and also because of the then generally accepted fact that crucible castings were of very high quality. The great difficulty with the crucible process was the crucibles themselves. They lacked uniformity, and were expensive. An average of three heats was considered good, and at that rate meant about 1 cent added to the metal cost. Many crucibles would not come up to this average and in order to save them as much as possible the final additions of ferrosilicon and ferromanganese were cut down to a minimum. The result was a steel of low manganese content, about 0.40 per cent, and, as a consequence, a steel which was not always deoxidized. The inability to keep the carbon low, because of the absorption of carbon from the crucible, was an added aggravation.

### Converter and Electric Process Compared

Our second method was the side-blown converter. The advantages of this method over the crucible process might be stated as follows:

The process enabled us to make larger quantities of metal at one time.

Our metal was uniformly hot and fluid and of fairly regular analysis.

We were able to increase our manganese content and, consequently, were getting very much better results on physical tests.

Our metal cost was much reduced. This was a distinct advantage, particularly since the cost varied little from month to month, while in the crucible it depended entirely upon crucible performance, over which we had no control.

Our third and very likely our final choice of method was the electric furnace, which had had our attention for a number of years. Our first furnace, a 6-ton Heroult, was installed in November, 1915. Our second furnace, of 3-ton capacity, was ready to operate Feb. 12, 1916. Both furnaces have been running continuously since their installation and our converters have been discarded.

### The Quality of Electric Steel

As regards the quality of the electric steel, there is no question as to its superiority over the converter metal. This applies to both acid and basic electric steel. It is only natural that this should be so if one compares the two methods. In the converter at the end of blow you have a mass of metal at a high temperature, covered by a highly oxidized slag, and the metal itself undoubtedly containing oxides. The addition of ferrosilicon and ferromanganese at this point deoxidizes the metal more or less completely, but it is still in contact with a slag carrying a high percentage of iron oxides, etc.

In the electric furnace the covering slag is completely deoxidized before the ferrosilicon and ferromanganese final additions are made. The metal is

constantly giving up oxides to the slag during the deoxidizing period, and is practically free from them before the final deoxidizers are added.

In our opinion it is the more complete absence of oxides in the electric steel which accounts for the superiority of this steel over converter steel. The results obtained on physical tests of electric steel are universally better. The following are typical:

Test	Maximum Strength, Lb. Per Sq. In.	Elastic Limit, Lb. Per Sq. In.	Reduction in Area, Per Cent	Elongation in 2 In., Per Cent	Silicon	Sulphur	Phosphorus	Manganese	Carbon
1...	66,750	42,500	51.7	35.0	0.23	0.025	0.044	0.74	0.19
2...	76,000	45,000	45.8	30.0	0.20	0.021	0.040	0.64	0.23
3...	62,400	36,500	50.0	32.0	0.27	0.043	0.036	0.52	0.19
4...	69,000	37,800	44.0	28.0	0.33	0.050	0.056	0.70	0.24

Of these Nos. 1 and 2 are from our basic furnace and Nos. 3 and 4 from our acid furnace. While the basic steel averages slightly higher than the acid steel, they are both very much better than the average results we were able to obtain from converter steel.

The great superiority of the electric steel lies in the fact that these results can be consistently obtained from every heat, which we were never able to do in our converter practice. We have made physical tests on 30 consecutive heats, and have, for every heat, obtained results corresponding to those above. With converter steel, we had great difficulty in maintaining an average reduction of area of 25 per cent, and the elongation was usually about 20 per cent.

### Shrink Tears and Cracks

The superiority of the electric steel was also manifested in the case of long, thin section castings such as cross members on engine supports. Our loss due to shrink tears was much reduced when we were using electric steel. On one particular pattern we made 100 castings from electric steel, and found no shrink tears whatever. With exactly the same practice we found 90 out of 100 castings made from converter steel had slight tears or cracks, which had to be welded in order to save the castings. We might add that this particular casting was very difficult to make and was perhaps an extreme case, but the test we made brought out this difference in behavior most vividly.

The reason for this behavior is due, no doubt, to two facts:

The lower sulphur contents of electric steel.

The absence of impurities, particularly of oxides.

The absence of oxides undoubtedly gave the electric steel a much greater strength at higher temperature, and this greater strength was able to resist the pull exerted on the steel during that period when the castings were shrinking or shortening. This behavior of electric steel was true with both acid and basic steel, particularly with the latter, where we could maintain a lower sulphur.

Thus far we have emphasized the high quality of the electric steel, which was the one essential point which induced us to abandon the converter process in favor of the electric furnace. Our hopes in this regard have been most fully realized. We feel further that the time is now at hand when this fact will be fully realized by the trade at large, as is evidenced by the increasing demand for electric steel.

It was especially pleasing to have the higher quality

\*From a paper presented at the thirty-first general meeting of the American Electrochemical Society at Detroit. The author is president and general manager Michigan Steel Casting Company, Detroit, Mich.

steel without any increase in cost. Under present market conditions, with low phosphorus pig iron selling at an exorbitant price, the electric steel can be produced at much lower cost than converter steel. As our practice improves, we feel confident that we can compete with converter steel even under normal market conditions.

#### Acid and Basic Linings Compared

At the present time we are using acid linings and bottoms entirely. Our reason for abandoning the basic process was the high and practically prohibitive price of magnesite. We were new consumers of this refractory and had not been able to secure a large supply, since the dealers were loathe to take on new customers and we were finally obliged to resort to acid practice.

Our experience has been most valuable to us, for we found one very great advantage in the acid process. One great difficulty with the basic electric process is the slag. Our metal was poured from the furnace into a large coffee-spout ladle, in which the metal was taken to the pouring floors. The metal was poured through the spout into hand shanks, from which the metal was poured into molds. In all cases the metal was skimmed by means of a metal rod skimmer when it was being poured into molds in order to keep all slag back. In spite of all precautions we had much more trouble from slag in our castings than we had ever had from converter steel.

With exactly the same pouring methods this slag trouble disappeared when we changed to acid steel. This was due to the greater refractoriness or higher melting point of the siliceous slag, which brought about a more complete separation of the slag from the metal.

The basic metal acted at times as though there were actually present in the metal a small amount of slag in solution, which slag would finally separate, as the metal lost its heat. In a number of tests which were made, when special precautions were taken to remove slag from the metal during the pouring, we still found slag spots on the machined surfaces of our castings.

#### "Reversed Duplexing Process"

The fact that with acid steel we have a minimum of slag trouble has led us to the conclusion that an ideal arrangement for a steel foundry would be to use a "reversed duplexing process" as it were. Part of the metal should be melted in a basic furnace, where it would be refined and sulphur and phosphorus eliminated in the usual way. The stock used in this furnace could be of a much cheaper grade and would more than offset the increased cost of rehandling the refined metal through the acid furnace as the next step in the operation.

In the meantime the acid furnace has been working on a partial charge of steel, to which, when molten, will be added the refined metal, from the basic furnace. The final deoxidization under an acid slag can then be completed and metal withdrawn in the same manner as is done now. The writer believes fully that this "reversed duplexing" can be so timed and manipulated in two or more furnaces, so that the ultimate output of the battery of furnaces will be the same in any given period as though the furnaces were all running either basic or acid independently.

This method of "reversed duplexing" would have several distinct advantages for the producer of steel castings:

The cost of part of the raw material would be much lower, since one could use a high sulphur and high phosphorus stock, as for instance screw machine turnings, which bring a low price on the market and cannot be used in acid practice.

The basic furnace could be run at a lower temperature during refining period and the life of roof and walls would be much prolonged. The final temperature could be attained in the acid furnace, where we have no difficulty in securing necessary temperature and fluidity without injury to lining. (We run up to 300 heats without repairing roof or lining.)

We would be able to obtain lower sulphur and phosphorus in our acid steel without increase in cost; in fact the final cost might even be less.

Our metal would receive final deoxidization under an acid slag. The advantage of this acid slag has already been emphasized, particularly the fact that it is more refractory and separates more completely. There is one further advantage.

When the furnace contents are poured into the large ladle, the latter is immediately covered over with a congealed heavy slag crust, which keeps the air away from the steel and also keeps the steel hot longer. This is of great help where one is pouring a large variety of small castings, where fluidity and high temperature are most essential.

The writer believes this reversed duplexing process may be of great value in other products such as tool steel, piano wire, etc., where the absence of even minute slag particles is most desirable. It would be interesting to conduct a comparative test on these products, made in the ordinary way and made by this double process. The suggestion may not seem so far fetched, when one bears in mind the fact that the higher grades of steel were, until very recently, made by the crucible process, and in this process the slag was essentially an acid slag. How much of the quality possessed by these steels was due to the acid slag?

#### Alloy Steels by the Electric Process

One other advantage of the electric furnace should be mentioned—its great usefulness in making any of the alloy steels. This has been demonstrated by the constantly increasing adoption of the electric furnace by tool steel producers and other makers of special steel. This same advantage can also be put to use by the manufacturers of steel castings in the production of alloy steel castings.

Our experiences in making alloys in the converter process was most unsatisfactory, since we were unable to obtain consistent results. This was due, no doubt, to the highly oxidized slag and presence of oxides in the steel itself, so that in many cases the alloys were oxidized and would be present in your final product in varying and diminished quantities.

With the electric steel our results have been very gratifying. We have been able to obtain any desired analysis regularly, and in consequence our subsequent heat treatments have given us the high physical qualities which we were after. This opens up a large new field for the maker of small castings, since there is a large demand for alloy castings for certain purposes, where lightness and great strength and toughness are necessary.

#### The Question of Blow Holes

I wish to call your attention to one fallacy so often mentioned in the discussion of electric steel; that it is free from blow holes. Many of you have read the article on "Hydroelectric Power and Electrochemistry and Electrometallurgy in France" by C. O. Mailloux, the second installment of which appeared in *Metallurgical and Chemical Engineering*, March 15, 1917. Toward the end of the part treating on electrosiderurgy there is a quotation from an article by Paul Girod, appearing in 1912: "With the electric furnace one is sure to have for castings an absolutely dense metal without blow holes or pipes." Or to go even farther back, in an article appearing in 1907, in *Stahl und Eisen*, Professor Eichhoff, of Charlottenburg, in an article, entitled "Ueber die Fortschritte in der Elektrostahl Darstellung," states in his conclusions: "Dass der Stahl vollständig blasenfrei ist."

Every producer of steel castings wishes that this might be true. Without doubt the electric steel is purer and in consequence has within itself a minimum of impurities, which during the transition from the molten state to a solid mass would assume a gaseous form and cause blow holes. This much is granted as true. But, nevertheless, there is just as much cause for presence of blow holes in electric steel where the metal is poured into molds as when the metal is made by other methods. The cause for such blow holes is not inherent in the steel itself, but is due to the methods of making the molds and preparing them for the steel.

In other words, just as much care must be used in molding to make a good casting in order to maintain in the casting the high quality and strength possessed by the electric steel. Perhaps even greater care and vigilance must be used because of the very high temperature at which the steel is delivered from the electric furnace.

We have merely brought up this point in order to

emphasize the fact that the electric furnace is not a cure-all for all foundry woes and troubles. To make a superior casting the electric furnace metal must have a perfect mold, prepared with every possible care and attention to detail, properly gated, properly fed

and properly vented. When such a happy combination has been properly brought about the resultant casting will be superior, and in this manner only, and by no other methods can we derive the full benefit of the wonderful quality possessed by electric steel.

## Progress of the Electric Steel Industry \*

Some Interesting Early History—Steel Electrically Refined from Hot and Cold Charges Compared — Practical Results to Date

—BY DR. JOHN A. MATHEWS—

IT is nearly 40 years since Sir William Siemens constructed and patented an electric arc furnace which would melt steel. It is not recorded that he believed this laboratory furnace was the beginning of a new industry. Whether he thought so or not, he very clearly enunciated the reasons why electric furnaces ought to be superior to other furnaces where the product is in contact with the products of combustion of carbonaceous fuel.

The writer quoted these reasons a year ago in a paper presented before the American Iron and Steel Institute, but they will bear repetition. The advantages of electric melting, Siemens states, are:

The degree of temperature is theoretically unlimited.

The fusion is effected in a perfectly neutral atmosphere.

The operation can be carried on in a laboratory without much preparation, and under the eye of the operator.

The limit of heat practically attainable with the use of ordinary refractory material is very high, because in the electric furnace the fusing material is at a higher temperature than the crucible, whereas in ordinary fusion the temperature of the crucible exceeds that of the material fused within it.

In short, he says that the function of electric melting is to "effect such reactions and decompositions as require for their accomplishment an intense degree of heat, coupled with freedom from such disturbing influences as are inseparable from a furnace worked by the combustion of carbonaceous materials."

The soundness of these conclusions as applicable to commercial conditions have been amply confirmed during the past 10 or 12 years. Yet they appear like the fulfilment of prophecy, for they were overlooked and all but forgotten for 20 or 25 years, until there arose a group of engineers and inventors in several European nations during the closing years of the last century who perfected various processes for doing in the mills what Siemens had done in the laboratory. Their enthusiastic claims and rosy predictions were not received with much interest by the steel men. They were thought to be only the dreams of inventors or the wiles of the promoter.

### Professor Harbord's Early Views

The Canadian Government displayed commendable foresight when it appointed a commission in 1903 to investigate them at first hand in Europe. In their report in 1904, Professor Harbord, the distinguished metallurgical authority, stated:

Steel, equal in all respects to the best Sheffield crucible steel, can be produced, either by the Kjellin, Héroult or Keller processes, at a cost considerably less than the cost of producing high-class crucible steel, and,

At present, structural steel to compete with Siemens or Bessemer steel cannot be economically produced in the electrical furnaces, and such furnaces can be used commercially for the production of only very high-class steel for special purposes.

This opinion of a competent observer was not enough to overcome the conservatism of the crucible steel makers. The venerable crucible process had withstood the competition of Bessemer steel and of, first acid then basic, open-hearth steel, and it was only

natural that the new rival should be viewed with distrust, notwithstanding the illuminating report of the Canadian Commission.

The writer was at that time solely interested in the crucible-steel business, and found it very difficult to accept Professor Harbord's first conclusion except in so far as it applied to the induction type of furnace, in which, at that time, no purification of the charge was attempted, and to make good steel one started with selected raw materials just as in crucible melting. The combination of melting and refining in one operation did not appear promising, and such samples of steel as came to my attention did not tend to change my opinion.

### Electric Refining of Hot Metal

Reflection shows, however, that even the pure materials selected for crucible melting come from pig iron by the Walloon, Lancashire or puddling processes, and the finished product of these processes is notable for containing slag and oxides in large amounts and for a general lack of homogeneity. Why, therefore, should the more uniform liquid product of the open-hearth furnace, produced from the same pig iron, be an undesirable base material for electric furnaces, especially in view of the well-known reducing and deoxidizing conditions of the electric process, along with which goes ability to remove sulphur to a very large degree?

This view was generally accepted 10 years or more ago by Dr. Héroult and other metallurgists, and the earliest installations of electric furnaces consisted of an open-hearth furnace for preliminary melting and refining, the liquid steel being transferred to the electric furnace for deoxidation, desulphurizing and for making of additions or adjustment of the desired analysis.

Such an installation was first made in the United States by the Halcomb Steel Company, and is now in its twelfth year of operation. A similar installation was made at the Richard Lindenberg works in Germany at about the same time. Other plants soon appeared here and abroad, nearly all using the duplex process. In addition to the belief in the metallurgical soundness of the process, there was the further belief that electricity could not be successfully and commercially used to do the first melting, and this was true at the time, but now the lower cost of wholesale power and increased electrical efficiency make cold melting feasible in many localities.

At the May meeting of this Society in 1909, Paul Girod, the inventor of the Girod furnaces and a successful manufacturer of steel and ferroalloys in France, challenged the electric refining idea, and stated that one cannot make steel of crucible quality in the electric furnace starting with a molten charge of open-hearth or Bessemer metal. While no figures were presented in support of his opinion, the author stated that it was based upon actual experience. Mr. Girod's theory of all this was that at the high temperature of melting the solubility of open-hearth and Bessemer steel for metallic oxides, oxides of carbon, nitrogen and hydrogen was greatly increased; in fact, increased to such a degree that it was thereafter impossible to free the steel, wholly, from them in the electric furnace unless the charge were allowed to cool off and solidify, followed by remelting.

\*From a paper presented at the thirty-first general meeting of the American Electrochemical Society at Detroit, Mich., May 3, 1917. The author is president of the Halcomb Steel Company, Syracuse, N. Y.



Mr. Girod predicted, "that prospects based on this process of refining in the electric furnace of steel previously melted in the Martin or Thomas furnace may meet much disappointment."

#### Hot Metal Versus Cold Electrically Refined

After 12 years as pioneers in operating this process in America, we can truthfully say we have suffered no disappointment. Just recently has come to my attention the case of a very difficult Government specification, which has never been successfully met by any other material, and I know that at least two or three firms furnishing material melted in the electric furnace from cold scrap have failed to meet it. It must be admitted, however, that most of the recent electric-furnace installations are intended for cold melting. We have two such installations in operation and two under erection, but this is not because of any difficulties with the duplex method, which will certainly be continued. Having tried the two methods of melting, side by side, for a considerable period we see no reason for accepting Mr. Girod's conclusions. In fact, if electric furnaces of large size, say, from 10 tons and upward, are to be a success, we believe it will only be upon the basis of using molten charges. They are not altogether successful as cold melters.

The choice of processes seems to be an economic rather than a metallurgical consideration, and local conditions for each installation must govern the choice, while the final success by either process is a matter of individual skill of operation. Our results with either method fully substantiate Professor Harbord's conclusions.

The electric furnace has not replaced the crucible furnace or crucible steel; its field has been the "production of very high-class steel for special purposes," as stated in Mr. Harbord's second conclusion. In this capacity, the electric furnace was most timely to meet the demands for just this class of material, which arose simultaneously with the birth of the automobile and aeroplane industries. New requirements for materials of construction came into being along with them, and it is in meeting these requirements that the electric furnace finds its best and greatest application. To these, of late, have been added the requirements for munitions of war. Our own furnaces, so far, have not been used for this class of material.

#### Practical Results of Electric Melting

Sir William Siemens stated very briefly and simply the conditions obtainable in the electric furnace. What are the practical results which follow from such conditions? Why does the electric furnace, with proper handling—I repeat it, with proper handling—produce a superior product for the most severe requirements of automobile, aeroplane and munition manufacture?

Experience shows that chemical composition of consecutive heats can be held more closely to a standard than with any other process. This is most noticeable when handling easily oxidizable metals like vanadium, chromium, silicon and manganese.

From this it is apparent less of these metals will have to be added to insure a given final minimum, hence there will be less of the oxides of these metals produced to be removed from the steel.

The more nearly composition can be controlled, the more certain are the results of subsequent heat treatments.

Electric steel is usually chemically purer than any other. Sulphur, especially, is readily removed. There has been considerable written of late to show that the effects of sulphur are not as harmful as generally believed. Be that as it may when the sulphur is uniformly distributed, yet it is obvious that segregation of elements is impossible if they are absent. It also follows, if segregation of sulphur and phosphorus are not to be feared, the percentage of cropping may be reduced and the yield of sound metal increased—a step in the direction of economy and conservation.

Low sulphur in electric steel usually means

a prior reducing condition favorable to complete deoxidation. This condition is favorable to sound ingots, freedom from blow holes and seams produced from them. Quiet metal has less tendency to segregate in the mold, as to either metallic or non-metallic elements, and produces steel free from "ghost" lines or laminations.

Alloy additions may be made in the furnace rather than in the ladle, increasing the chance of thorough assimilation, diffusion and homogeneity.

Electric steel is less easily injured by overheating than is the case with other steel. It will stand more heat in the forging or heat-treatment without injury; that is, it has a wider safe heat range. This opinion has the weight of both experimental evidence and practical experience in the hands of competent observers among users.

Electric steels are usually freer from slag and non-metallic inclusions than are Bessemer and open-hearth steels.

All of the above characteristics make for quality, when quality is the first consideration. The electric furnace possesses an economic value in its adaptability for handling and recovering alloy scrap values. Some alloy scraps do not make desirable additions to open-hearth furnaces or, if made, a large share of the alloy metal is lost in the slag. With the wide-spread and increasing use of alloy steels it is highly desirable that alloying elements be not lost when contained in the scrap.

These advantages and others follow because, as Siemens observed, "the fusion is effected in a perfectly neutral atmosphere," and because a number of distinguished engineers and inventors produced commercial workable furnaces in which these results could be attained on a large scale.

#### Skilled Operation Necessary

Electric furnaces, like automobiles and aeroplanes, are of little use without skilled operators. They are not automatic devices which run themselves. They are not nearly as foolproof as crucible furnaces, which require considerable skill, but of a different order from that required for electric melting, assuming that steel of equal quality is to be produced by either process. In the one case, selected materials are used as the charge and no purification is attempted; in the other case very impure materials may constitute the charge from which well refined and deoxidized metal results if and when the melter is competent to carry on the reactions involved. Just as with the best of automobiles, so with electric furnaces, things sometimes go wrong in spite of careful operation. At such times special skill is required to diagnose the ailment and to effect a cure. It is feared that this consideration was overlooked by many firms installing furnaces during the past few years, for in many instances they were put into plants where formerly no steel making of any kind was done, and electric steel will likely be discredited through no fault of electric furnaces, but because of incompetent operation.

#### Pre-eminence of the United States

The United States has taken the lead in electric-furnace development, after a very slow start in which we seemed to be lagging behind some of the European countries. In our own plant we have grown from 500 kva. to 5500 kva. of installed capacity for electric melting, while in the U. S. A. there is no less than 150,000 kva. in operation or just being installed. The annual tonnage capacity of the furnaces using this current I estimate to be about 1,250,000 gross tons of ingots and castings. This infant industry already represents an output about eight times as great as the crucible-steel production and one-eighth that of Bessemer production. These two processes are not declining, but are more or less stationary, with wide annual fluctuations.

The electric furnaces are at hand—over 100 of them in the United States—for making large quantities of the highest grade of steel and alloys to meet the growing demands of the industries requiring special quality. Equipped as we are, we must become the leading nation

in both quality and quantity of electric steel production, as we now are in crucible, open-hearth and Bessemer steels.

With wise state and national policies affecting hydro-electric developments, we may see a great electric steel trade develop without impairing our coal reserves. At the same time, we shall conserve alloy materials, recover good steel from low-grade scrap, and produce a maximum yield of especially sound steel from a minimum of raw materials used. If the Government will

take an enlightened view of conserving our coal by developing or permitting the development of those great and inexhaustible sources of power—the waterfalls—the electric steel manufacturers will do their bit toward practical conservation. The electric furnace can utilize power, which, once over the falls, is gone forever; reclaim materials, which, in fuel-fired furnaces, are irretrievably lost, and produce from them products necessary to the advancing demands of the arts of peace, as well as to the national defense.

## Iron and Steel Products Defy Submarines

Exports for March Show a Surprisingly  
Large Total—Gain of 90 Per Cent in  
Values Over Same Month Last Year

WASHINGTON, May 8, 1917.—Whatever gains the German submarine campaigns may have made in the destruction of the commerce of the Allies during March, the undersea operations of the Teutons made no impression whatever upon our exports of iron and steel during that month, according to the official returns of the Bureau of Foreign and Domestic Commerce. The statistics for February, showing substantial declines, and the recently published records of submarine activity, foreshadowed a decrease in the exports in March of all forms of war material, which, presumably, are the special objects of attack, but the official figures record a sharp upward turn with totals equalling or exceeding the record figures of January.

Exports of iron and steel, by values, during March gained 2 per cent over the record total of January of this year, and no less than 90 per cent over that of

as compared with those of March, 1916, closely approximated the aggregate shipments of January of this year, and fell but 5.7 per cent short of the record total of September, 1916. Exports of machinery kept pace with the general movement, gaining 50 per cent as compared with March, 1916, slightly exceeding the high figures of January of this year and lacking but 2 per cent of the unprecedented total of August, 1916. Shipments of machine tools, which have made an erratic record since the beginning of the European war, gained 20 per cent over the figures for March, 1916, nearly equalled the exports of January of this year, but fell 16 per cent short of the record figures of May, 1916, when the demand for tools for the fitting up of foreign munitions plants was at the maximum.

For the nine months ended March, the total exports of iron and steel surpassed by 95 per cent the

Exports of Iron and Steel

	March		Nine Months	
	1916, Gross Tons	1917, Gross Tons	1916, Gross Tons	1917, Gross Tons
Pig iron	19,110	69,629	190,818	645,629
Scrap	13,112	38,506	97,978	203,561
Bar iron	10,272	5,337	51,899	47,377
Wire rods	11,559	12,914	124,137	102,630
Steel bars	57,111	52,368	428,238	561,971
Billets, ingots and blooms, n.e.s.	107,696	193,469	614,157	1,414,996
Bolts and nuts	2,432	2,757	23,929	22,425
Hoops and bands	4,161	3,691	31,298	32,337
Horseshoes	305	166	10,132	3,244
Cut nails	317	240	3,621	3,560
Railroad spikes	2,611	1,821	19,268	14,687
Wire nails	11,407	6,824	88,423	97,725
All other nails, including tacks	553	1,482	7,188	13,412
Cast-iron pipes and fittings	3,165	8,129	37,193	59,161
Wrought pipes and fittings	8,992	9,992	93,468	131,788
Radiators and cast-iron house heating boilers	147	627	1,849	2,767
Steel rails	49,034	52,469	420,851	474,812
Galvanized iron sheets and plates	6,059	7,926	56,463	68,431
All other iron sheets and plates	3,037	3,650	30,049	33,440
Steel plates	18,613	41,439	208,873	258,738
Steel sheets	8,121	9,696	69,684	81,502
Structural iron and steel	21,591	29,509	201,895	258,630
Tin and terne plates	20,364	21,679	153,751	164,270
Barb wire	37,242	16,079	259,858	263,528
All other wire	21,139	16,161	178,937	184,122
Total	438,150	606,560	3,404,009	5,144,743

March, 1916. Advancing values suggest a slight discounting of the March figures of this year, but it is nevertheless obvious that the export movement was strongly sustained and that its volume materially exceeded the average of the preceding six months.

Shipments of tonnage commodities rose 38 per cent

corresponding period of 1916, which exceeded all previous nine months' periods by more than 100 per cent. Shipments of tonnage commodities gained 50 per cent; machinery 55 per cent, and machine tools 75 per cent, as compared with the nine months of 1916.

The value of all shipments of iron and steel products in March, 1917, was \$111,164,876 as compared with \$58,300,297 for the same month of 1916 and \$108,423,640 for January of this year, when high water mark was reached. For the nine months ended March, 1917, the total was \$800,626,622 as compared with \$413,421,252 for the same period of 1916, which was an advance of considerably more than 100 per cent over any previous corresponding nine months. Exports of machinery in March were valued at \$24,135,772 as compared with \$16,243,981 for the same month of 1916. While August still leads in the exports of machinery with a total of \$24,657,597, the margin is exceedingly small. Shipments of metal-working machinery in March aggregated \$8,281,840 as against \$6,501,022 for the same month of 1916. The record in exports of

Imports of Iron and Steel

	March		Nine Months	
	1916, Gross Tons	1917, Gross Tons	1916, Gross Tons	1917, Gross Tons
Ferromanganese	.....	5,324	.....	61,059
Ferrosilicon	716	977	3,762	95,213
All other pig iron	7,789	1,104	81,782	27,454
Scrap	3,635	26,809	79,621	157,163
Bar iron	162	158	5,171	4,148
Structural iron and steel	165	54	1,098	730
Hoop or band iron	.....	.....	470	.....
Steel billets without alloys	769	1,879	6,490	6,147
All other steel billets	910	581	7,208	9,355
Steel rails	412	193	39,599	11,209
Sheets and plates	189	181	1,309	1,586
Tin and terne plates	44	21	494	674
Wire rods	366	.....	3,390	2,063
Total	15,153	37,281	230,394	376,701

metal-working machinery is still held by May, 1916, with a total of \$9,835,806. Exports of machinery of all kinds for the nine months ended March, 1917, were valued at \$189,595,213 as compared with \$122,633,428 for the corresponding period of 1916, which was easily the record total for the nine months. Details of the exports of machinery for March, 1916 and 1917, and

accompanying table shows the exports for March and for the nine months ended March, 1917, as compared with 1916.

The imports of tonnage iron and steel in March gained no less than 150 per cent over the same month a year ago, the increase being due almost entirely to larger receipts of scrap. In considering these statis-

## Exports of Machinery

	March		Nine Months	
	1916	1917	1916	1917
Adding machines .....	\$120,809	\$206,274	\$657,671	\$1,194,329
Air-compressing machinery .....	53,346	67,360	402,070	817,894
Brewers' machinery .....	1,067	6,209	20,851	14,239
Cash registers .....	154,601	68,159	957,463	1,100,783
Parts of .....	21,744	3,777	92,418	96,176
Cotton gins .....	2,579	10,449	58,037	89,536
Cream separators .....	29,344	74,521	358,199	284,117
Elevators and elevator machinery .....	237,625	191,592	1,095,767	1,538,164
Electric locomotives .....	15,784	26,673	395,376	474,002
Gas engines stationary .....	21,253	63,350	244,520	461,486
Gasoline engines .....	1,394,653	2,094,379	6,698,601	11,585,460
Steam engines .....	212,660	2,077,010	11,641,548	13,302,011
All other engines .....	552,050	689,002	1,748,695	3,555,391
Parts of .....	617,761	1,347,857	4,872,940	12,762,083
Laundry machinery, power .....	49,285	14,476	215,687	222,439
All other .....	11,115	16,484	206,301	245,685
Lawn mowers .....	16,671	7,684	187,464	116,569
Metal-working machinery (including metal-working tools) .....	6,501,022	8,281,840	36,360,844	63,582,427
Meters, gas and water .....	27,721	34,767	192,768	273,518
Milling machinery (flour and grist) .....	167,960	79,945	1,948,448	905,034
Mining machinery, oil well .....	57,617	103,493	843,328	1,470,521
All other .....	492,199	1,048,026	4,767,332	7,355,163
Paper-mill machinery .....	48,453	163,924	703,182	1,342,645
Printing presses .....	88,360	90,248	1,090,215	1,400,951
Pumps and pumping machinery .....	279,509	596,163	3,198,976	4,560,475
Refrigerating and ice-making machinery .....	25,655	143,443	510,497	647,356
Sewing machines .....	490,568	665,457	4,085,194	4,457,401
Shoe machinery .....	87,487	149,776	1,014,248	998,376
Sugar-mill machinery .....	93,585	323,945	5,271,324	9,323,154
Textile machinery .....	316,803	315,292	1,722,606	2,666,706
Typesetting machines .....	97,186	126,141	511,347	859,154
Typewriting machines .....	842,010	880,197	6,295,551	8,336,762
Windmills .....	93,643	100,814	724,170	597,266
Wood-working machinery, saw-mill .....	59,112	44,409	262,826	356,205
All other .....	120,501	94,699	882,992	737,693
All other machinery and parts of .....	2,842,243	3,957,937	22,443,966	31,864,043
Total .....	\$16,243,981	\$24,135,772	\$122,633,428	\$189,595,213

for the two nine months' periods are given in the accompanying table.

Exports of iron and steel for which quantities are given aggregated 606,560 gross tons in March, 1917, as compared with 438,150 tons in the same month of 1916. September, 1916, holds the record for exports of these commodities, with a total of 643,763 gross tons. The shipments in January of this year aggregated 608,286 gross tons. For the nine months ended March, 1917, the shipments were 5,144,743 gross tons as compared with 3,404,009 tons for the same period of 1916. An

ties the fact should be borne in mind that ferromanganese, which, in March, 1917, was a substantial item, was included with "all other pig iron" in the corresponding month of 1916. The total receipts of tonnage iron and steel in March aggregated 37,281 gross tons as compared with 15,158 for the same month of 1916. The imports for the nine months ended March, 1917, were 376,701 gross tons as compared with 230,394 tons in 1916. The accompanying table shows the imports of tonnage commodities for March, 1917, and for the nine months ended March as compared with 1916.

W. L. C.

## TARIFF RATES RAISED

## Ways and Means Committee Takes Radical Action on War Bill

(By wire)

WASHINGTON, May 9, 1917.—The Ways and Means Committee late last night completed the war revenue bill which will be reported to the House this afternoon and taken up for consideration to-morrow. It was designed to raise \$1,800,000,000. At the last moment, in view of the fact that the probable revenue under the measure promised to fall short of the needs of the treasury, it was decided to make a flat increase in all tariff rates of 10 per cent and to impose a 10 per cent duty on all articles now on the free list. The committee, on two previous occasions, had formally voted down propositions to make changes in the tariff.

The present excess profits tax is doubled, being increased to 16 per cent in excess of net earnings of 8 per cent plus \$5,000. The normal tax on individual and corporate incomes of 2 per cent under the present law is increased to 4 per cent. The exemption of individual incomes is lowered from \$4,000 to \$2,000 for married persons and from \$3,000 to \$1,000 for the unmarried. Surtaxes are imposed in addition to the normal 4 per cent on individual income, and range from 16 per cent on incomes of from \$5,000 to \$7,500 up to 33 per cent on all exceeding \$500,000. It is also proved that all persons making income tax returns for the calendar year 1916 shall pay a special surtax equal to one-third on the tax for that year at the old rates.

In addition to the existing inheritance tax, increases are provided by the bill, ranging from one-half of 1 per cent on estates of \$50,000 up to 15 per cent on estates of \$15,000,000 and over.

Automobiles, yachts, motor boats, pleasure boats, etc., are taxed 5 per cent of the manufacturer's price and a like rate is levied upon the charges imposed by petroleum pipe lines and upon all sums paid for electric power, including that used for heat and light. Subscribers for telephone service will be assessed 5 per cent on the amount of their bills and 5 cents on each telephone or telegraph message amounting to 15 cents or more. The taxes on distilled spirits, fermented liquors and tobacco are approximately doubled and a long list of documentary stamp taxes is carried by the bill. A war surtax of 1 cent is authorized for every letter or post card and second class or publisher's postage rates are increased in accordance with the parcel post zone system, beginning with 2 cents per pound for delivery within the first and second zones and running to 6 cents in the eighth zone. So called religious, educational, agricultural, labor or fraternal publications issued without a profit will pay one-half cent per pound in addition to the present rate, irrespective of zones.

The radical changes made in the bill just before it was completed, which reflect a panicky state of mind on the part of the committee lest the measure should not produce sufficient revenue, will provoke vigorous opposition and as already foreshadowed in this correspondence, it is the best opinion here that the Senate Finance Committee, rather than the Ways and Means, will frame the bill as finally enacted.

W. L. C.



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# THE IRON AGE

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## A Time to Be Fair to Industry

Two propositions are getting recognition as the economic phases of war preparations become more clearly defined at Washington. One is that to make the tax burdens of industry so great as to check its prosperity and prevent its further expansion would be a serious mistake. The other is that for the Government to exact special price concessions from industries chiefly depended upon for war material is putting upon a fraction of the producing machinery of the country an undue proportion of the cost of the war.

In their intense desire to bring home to the nation the responsibilities of entering the war some of the framers of tax legislation have planned to get large income for the Government by heavily taxing all war activities. They have failed to give due weight to the large sacrifice of men the war may impose on this generation and the high costs of all necessities of life which will rule throughout the war—from both of which the generation following the war will be exempt. They have underestimated also the debt those who come after will owe this generation for so colossal an undertaking for humanity. Thus we have the plan to raise by taxes what might better be carried forward in large part in the form of bonds. Strongly arguing against this plan is the certainty that our industries, if too heavily taxed, cannot prepare to meet the demands upon them after the war. They are prosperous now; but unjust taxation would curtail their prosperity. That fact is being better appreciated in the threshing out of tax proposals in Congressional committees.

On the related question of large concessions to the Government on the purchases it makes there is some new light since the gratulatory announcements by department heads, of the large "savings" secured to the people on certain contracts. In the buying of steel for war purposes the question now comes up of joint buying by the United States Government and its Allies. One such transaction in the steel trade is already under negotiation. It can only be a matter of surprise to representatives of Great Britain that the policy which our Government started to follow in its steel buying differs so far from that to which they are accustomed. Great Britain has not hesitated to buy steel and metals at prices close to the prevailing market. It has not objected to the continuance of the prosperity the

war brought to its steel companies. Wages were involved in many cases through sliding scale agreements. It was not desirable that they should be brought down. It was argued also, no doubt, that as the war was carried on by and for the whole people, there was no justice in singling out the industry that was drawn upon so largely for war material and requiring it to make special concessions.

Our own Government has had reason to see the mistake of the step first taken in forcing such radical reductions in steel prices as to 2.90 cents, Pittsburgh, for plates and 2.50 cents for bars and structural shapes, and in copper to nearly 50 per cent less than the market. Leaders in industry, who have been giving their time and their unusual talent without stint to the service of the Government since war preparations were actively started, have not hesitated to say that the next purchases of copper, which it is expected will be made by the Government in conjunction with its Allies, should be at substantial advances upon the 16 2/3-cent basis of the first contract. In its recent spelter purchase of 25,000,000 pounds the Government paid 9 cents for prime Western, whereas the market to-day is 9 1/8 to 9 1/4 cents. It is true that 9 cents practically represents cost for many producers, with zinc ore at \$75, but it is also to be said that on the next Government purchases of spelter, which will be much larger than those just made, higher prices are to be looked for. Other evidence of the willingness of the Government to pay a price that will yield a fair profit to the producer is seen in its recent purchases of sheets for tent stoves and steel helmets at but little below current Pittsburgh quotations. It is well for the metal industries and all that are related to it, that the British Government's policy of the least disturbance to market values, in purchases of war material, is commending itself, even tardily, to the authorities at Washington.

## Dangerous War Legislation

The war is giving opportunities to countless radicals to urge their theories upon the Government, so that, as in Germany, the state would be so strong that liberty would languish and the world would be very far from a "place safe for democracy."

Lord Bryce, in a recent address in London, pointed out that while in the old sense of the words, civil and religious liberty had been achieved in England, liberty is now facing a new attack from a sep-

arate quarter in the demand that the state should at once step in to "take charge of and direct branches of industry and commerce which have hitherto thriven without that direction—establishing banks, financing enterprises, organizing companies to exploit the resources of tropical colonies, perhaps secretly inspiring those methods of peaceful penetration by which Germany was trying to reduce her neighbors to financial vassalage."

Lord Bryce explained that those are Prussian methods, for in Prussia the state is all in all and the individual is absorbed by it. He does not believe in the old *laissez-faire* doctrine, but he insists that all Liberals must reserve their individual freedom and initiative which have been "the glory and the strength of Britain." This is equally true of the United States. While all the demands above enumerated have not yet been made in this country, bills giving autocratic power to the President and members of his Cabinet are pending, one of which is the censorship bill and another the bill which would make the Secretary of Agriculture a czar over the agricultural interests of the country even to the extent of fixing maximum and minimum prices. In some cases, agitators who long have been trying to accomplish their ends against certain business interests are now assuming an "I've-got-you-now" attitude and are confident that under the pretense of military necessity they will accomplish their purpose. There is grave danger that they will do so.

Every patriotic citizen believes in giving the Government the heartiest support, but there should be a long look ahead lest we build a state so strong that the great object for which the Entente Allies are fighting will not be accomplished, even if Germany should be defeated on the battlefields.

### Getting Rolling Stock for Europe

That the current output of all plants engaged in the production of locomotives, rolling stock and rails will soon be diverted to Europe and that passenger train schedules will be cut down with a view to shipping abroad as many locomotives and cars as can be spared, was foreshadowed in an address delivered by Daniel Willard before the National Defense Conference of governors and representatives of State defense organizations held at Washington in the past week. It is also proposed to increase greatly the efficiency of the railroads by adopting certain war measures which will enable the carriers to maintain a satisfactory passenger and freight service with a reduced equipment. The general railroad board, co-operating with the Council of National Defense, hopes to release for freight trains not less than 4000 of the 14,000 passenger train locomotives in use in the United States, and this without seriously inconveniencing the traveling public. In his address Mr. Willard said:

It is vital that France and Russia have locomotives and cars. We will have to furnish them. How can we do it? We can do it by getting along with what equipment we have and by putting into force measures of greater railroad economy. By reducing the time allowed shippers to load and unload cars we will save 245,000 freight cars for one trip a year. Germany has reduced the loading and unloading time limit to six hours. We

can reduce our present limit from 48 to 24 hours, and although it will cause some inconvenience it is in the interest of all the people.

There will be more war time rail business than the lines can handle. The country's systems are hauling more freight than ever before, but they cannot carry all that is in sight, and it will be necessary for the general railroad board to decide which classes of freight shall have preference. Already the board has said coal must go first and we are filling the country's coal yards for next winter.

I shall give you an instance of what we have accomplished in economy of transportation. Heretofore the railroad lines have taken coal from the East to the Pacific coast in steel cars and returned the cars empty. The railroad board and shippers put their coal in box cars, and these cars are now being returned loaded with freight. It caused some inconvenience in unloading, but everybody concerned patriotically agreed to accept the change. We are now rushing coal from the central fields to the Northwest by way of the Great Lakes, and all other freight goes behind the coal. I can say I believe this means there will be no coal shortage in that region.

Mr. Willard added that iron ore would be preferred and that the Department of Agriculture had asked that seeds and agricultural implements be given preference, a suggestion to which the railroad board had promptly acceded.

Supplementing Mr. Willard's statement the general railroad board has issued an appeal to the carriers of the country "to do their full share in the defense of the nation," even though it may entail larger operating costs. Conservation of motive power is recommended by the board by reducing the number of locomotives ordinarily under repair from the average of 15 per cent to 10 per cent, which would be equivalent to adding 3325 to the number in service; increasing the average miles per day of a locomotive from 75 to 90 by quick turning at terminals, double crewing or pooling, which will have the effect of adding 13,300 locomotives, and by giving close attention to boiler repairs and firing methods which would enable each locomotive to haul from 20 per cent to 30 per cent more freight. Increased car efficiency can be obtained by quicker terminal handling, prompter loading and unloading, by loading each car 10 per cent in excess of its marked weight capacity and by reducing to 4 per cent the average number under repair, releasing 64,000 cars for active service. Quicker movements, it is estimated, would release 515,000 cars and heavier average loading, 200,000. Substituting mixed train service where possible and moving company freight and supplies as fast as possible on trains that cannot otherwise carry full tonnage, would further increase efficiency. Embargoes to prevent congestion are avoided.

Another expedient, which is expected to yield an addition of 75,000 to the car supply is a change in car service rules permitting the loading of box cars for points not in the direction of the road owning the car. The Railway Business Association also suggests that shippers have an obligation in the improvement of transportation which can be met by fuller car loading and prompter loading and unloading, also the timing of orders for fuel and staples at seasons when there is a return movement of empty cars. The slogan of the association should be widely spread and heeded: "Let no receiver of

freight forget that he who saves a pound of tractive power is fighting for his country and for the freedom of the world."

### Efficiency in Munition Factories

Pursuant to a resolution passed by the Council of National Defense the Department of Labor is reprinting the reports of the committee appointed by the British Minister of Munitions to investigate conditions affecting the health and welfare of workers. The first part appeared this week as Bulletin No. 221 of the Bureau of Labor Statistics and covers hours of work, Sunday labor, fatigue, sickness and injury, ventilation and lighting, etc. A later bulletin will cover welfare work and another will cover the employment of women and juveniles.

With many of the findings of the English committee American manufacturers are already more or less familiar, but there is of course a greatly added interest, now that the United States is at war, in what the British manufacturers ascertained after more than a year of experience in intensive production. An extended review of the British studies, having to do particularly with the fact that there is for every kind of work an apparently definite best number of hours to which the work should be limited, was printed in THE IRON AGE of Feb. 22.

It is impossible to summarize here what is presented in 150 pages of carefully prepared matter, but as suggestive of the general scope it may be said that Sunday work is almost unqualifiedly condemned, the limit of ordinary labor is placed at about 60 to 64 hr. per week, and extra shifts are not favored except in cases in which plant facilities fall short of the supply of workmen. Emphasis is placed upon the fact that long hours impose a burden not well borne by foremen and others in administrative positions, whose efficiency it is particularly necessary to maintain. Considerable emphasis is laid upon the advantage of a stoppage of 10 to 30 min. for tea. It is somewhat surprising to learn that in many cases in which an 8-hr. shift system was established each shift worked only 4 hr. at a time, alternating with another shift. This saved the necessity for time out for meals, but had no other advantage as the men could not profitably employ the 4-hr. interval.

Fatigue is defined as "the sum of the results of activity which show themselves in a diminished capacity for doing work," for the familiar bodily sensations are a fallacious guide to the true state of fatigue and a wholly inadequate measure of it. Fatigue should be measurable at any stage, and before its signs appear plainly, or at all, in sensation.

In studying the findings of the British committee American manufacturers must of course bear in mind that an agreement had been reached in March, 1915, between the British Government and the trade unions whereby all rules and customs tending to restrict production or limiting the employment of semi-skilled or female labor were to be suspended for the period of the war, previous conditions to be restored after the war. No such arrangement obtains in the United States, and even the promise that there will be no strikes or attempts to increase the scope of unionism has not been kept in the case of the tin-plate industry.

It would be very misleading, as was noted edi-

torially in the issue of THE IRON AGE mentioned, to proceed on the assumption that British experience in speeding up the manufacture of munitions would be duplicated in American industries involving technically similar operations, but having a different product. Whatever the degree to which the great majority of the British workmen had their heart in the work and felt themselves, in the production of shells, important in relation to those at the front who should discharge them, American workmen, engaged in the manufacture of other products, might not have the spirit to crowd into 48 hr. per week as much effort as they would naturally expend in 54 hr. In all efforts to apply British experience the mental attitude of the workman must be taken into account.

This point naturally leads to the observation that in the vast amount of war work that lies before the American people by far the major part is in activities which the workers' imagination does not spontaneously associate with the actual prosecution of the war, yet the patriotic motive is of vital importance in the matter of increasing results. Foremen and superintendents have their work laid out for them, to establish the feeling that the work is a help to the prosecution of the war, though the connection be much less direct and apparent than is the case with the manufacture and discharge of a shell.

### Machine Tool and Engineering Meeting at Cincinnati

The joint session of the National Machine Tool Builders' Association and the American Society of Mechanical Engineers is scheduled for Tuesday afternoon, May 22, at 2.30 P. M., at the Hotel Sinton, Cincinnati. Two addresses are to be made, one on the "Trend in Engineering Training," by Dean Herman Schneider, of the University of Cincinnati, and the other on the "Human Potential in Industry," by Dr. Otto P. Geier, Cincinnati Milling Machine Company.

The munitions sessions which the American Society of Mechanical Engineers is to hold will occur on Wednesday morning at 10 a. m., and Thursday morning at 10 a. m. The program for the first session is as follows:

Opening remarks by Maj. E. D. Bricker, ordnance department, Frankford Arsenal, and Lieut. T. S. Wilkinson, Jr., U. S. N. Bureau of Ordnance.

Munitions Contracts and their Financing, by Frederick A. Waldron.

Organizing for Munitions Manufacture, by Arthur L. Humphrey.

Organization for Munitions Manufacture, by Harry L. Coe. Procuring Special Machines for Munitions Manufacture, by H. V. Haight.

Practical War-Time Shell Making, by Lucien I. Yeomans.

The program for the second munitions session includes the following:

The Design of Munitions for Quantity Manufacture, by J. E. Otterson.

Procuring Materials for Munitions, by C. B. Nolte. Limits and Tolerances for the Manufacture of Munitions, by A. W. Erdman.

Gages and Small Tools, by F. O. Wells.

The Importance of Intelligent Inspection in Munitions Manufacture, by E. T. Walsh.

The machine shop session is scheduled for Tuesday morning, 10 a. m., with these papers: "A Foundation for Machine Tool Design and Construction," by A. L. DeLeeuw, Singer Mfg. Company, Elizabethport, N. J.; "Machine Shop Organization," by Fred G. Kent; "Metal Planers and Methods of Production," by Charles Meier.

Simultaneous with the machine shop session is a general session to consider the following papers: "Tests of Uniflow Steam Traction Engines," by F. W.



Marquis, Ohio State University, Columbus; "Relation of Efficiency to Capacity in the Boiler Room," by Victor B. Phillips; "Radiation Error in Measuring Temperature of Gases," by Henry Kreisinger and J. F. Barkley, U. S. Bureau of Mines, Pittsburgh; "Development of Scientific Methods of Management in a Manufacturing Plant," by Sanford E. Thompson and associates; "Disk Wheel Stress Determination," by S. H. Weaver.

Besides the second munition session on Thursday morning there is to be an industrial-safety session, to consider the proposed code of safety standards for industrial ladders, and a gas power session, with the following papers: "The Problem of Aeronautical En-

gine Design," by C. E. Lucke, Columbia University; "Test of a Motor Fire Engine," by Horace Judd, Ohio State University; "Design of Motor Truck Engines for Long Life," by John Younger, Pierce-Arrow Motor Car Company, and "Relations of Port Area to the Power of Gas Engines and Its Influence on Regulation," by J. E. DuPriest, University of Idaho, Moscow, Idaho.

On Tuesday evening there is to be a smoker for the machine tool builders and mechanical engineers, and on Wednesday evening an informal dance is scheduled. Monday, Wednesday and Thursday afternoons have been reserved for visits to points of interest and various industrial plants.

## No Government Engrossment of Steel Output

Shipping Board Plans No Such Sweeping  
Control of Mills as Has Been Announced—  
But Much More War Material Is Wanted

WASHINGTON, May 8, 1917.—The attention of high officials of the United States Shipping Board was drawn to-day by the correspondent of THE IRON AGE to publications in the daily press purporting to forecast plans of the board to solicit from Congress an appropriation of \$1,000,000,000 "for the building of a great American merchant fleet to overcome the submarine menace" in accordance with a program which "contemplates the diversion to Government uses of the products of every steel mill in the country, cancellation of existing contracts between those mills and private consumers, and where necessary payment of damages by the Government to the parties whose contracts are cancelled." These reports state further that "the only manufacturers of steel to be exempted from the program will be those needed otherwise for the national defense and by the railroads," which will be permitted to receive "the minimum amount of steel products with which they can get along."

The correspondent of THE IRON AGE is in position to state that these reports are unauthorized, premature and inaccurate. The plans of the Shipping Board for the construction of an emergency fleet have expanded rapidly as they have matured and it is now certain that a much larger appropriation will be sought from Congress than the \$200,000,000 estimate heretofore made, in addition to the \$50,000,000 already appropriated. The total sum that will be required, however, cannot now be stated.

It has already been authoritatively announced that the Shipping Board will supplement the fleet of wooden ships with as many steel vessels as can be built and for this purpose it will exhaust every resource to procure the necessary building facilities, materials and labor. That any such drastic measures as those suggested in the reports quoted from the daily press will be resorted to has not been determined, and it is regarded as altogether possible, if not probable, that the requirements of the board will be met by the voluntary action of the steel trade and without the necessity for the commandeering of either plants or products.

The members of the Shipping Board are deeply impressed with the necessity of building in the shortest possible time several million tons of merchant shipping to prevent the starving of England by the operations of the German submarines. That this object is paramount, even to the sending of troops and war material to Europe, is the opinion of members of the board, who believe that no consideration should interfere with the merchant construction program. It is realized, however, that Congress must pass upon the measures devised by the board and that the House and Senate will view the board's plans from a standpoint that will

embrace all other war projects of the Government. How far Congress will be willing to go in carrying out the wishes of the board cannot be foreshadowed, but it is conceded that the general disposition in both houses will be to give greater consideration to carefully devised and thoroughly practicable projects, no matter how comprehensive they may be, than to radical schemes involving drastic action which may disastrously unsettle the leading interests of the country.

So far as the steel industry is concerned, it is the best opinion here that the needs of the Government and of the Allies will result in more or less reorganization of its output and a concentration of production upon war material to a much greater extent than heretofore. The pooling of a large percentage of the output of the industry and its distribution between the Government of the United States and the governments of the Allies, possibly through the medium of an international board, is in contemplation. It is believed, however, that even this novel and far-reaching project can be worked out without disorganizing the industry and without the taking over of the practical control of manufacturing plants.

W. L. C.

### Aircraft Makers Ask Help of Materials Manufacturers

The Aircraft Manufacturers' Association desires to get into communication with all manufacturers of finished products and producers of raw materials entering into the construction of aircraft of all descriptions. It desires among other things samples of steel tubing, leather, aluminum, turnbuckles, aviators' wire, and catalogs of fittings, instruments and equipment of every sort. All communications, samples and data relating to the above materials should be addressed to the Aircraft Manufacturers' Association, 501 Fifth Avenue, New York.

The association is composed of the following: Aero-marine Plane & Motor Company, 1881 Broadway, New York; L. W. F. Engineering Company, College Point, L. I., N. Y.; Standard Aero Corporation, 1381 Woolworth Building, New York; Sturtevant Aeroplane Company, Jamaica Plain, Boston; B. F. Sturtevant Company, Hyde Park, Boston; Thomas-Morse Aircraft Corporation, Ithaca, N. Y.; Curtiss Aeroplane & Motor Corporation, Buffalo, N. Y., and the Burgess Company, Marblehead, Mass. Howard E. Coffin, Council of National Defense, Washington, D. C., and Sidney D. Waldon, Aircraft Production Board, 541 Munsey Building, Washington, are honorary members.

The Federal Machinery Sales Company, 12 North Jefferson Street, Chicago, has been made sales agent in the Chicago territory for the Oesterlein Machine Tool Company, Cincinnati, manufacturer of milling machines and cutter grinders.

## Government Purchasing at Market Prices

In view of the large merchant ship building program likely to be entered upon by the United States Government even before orders are distributed for the Navy Department's steel ship material needs, settled some weeks ago, as regards unit prices, a large steel manufacturer was interviewed on Wednesday morning. His ideas so concisely and soundly emphasized the care with which the Government should proceed in the new transactions and so likely represented the views of other steel makers that he was asked to put them in writing, and they are as follows:

"While the proposed shipbuilding program of the Government has not been finally settled, there is not much doubt that they will go ahead with it about on the lines suggested in the published statements.

"We feel very strongly that the steel required for this program should be purchased at current market prices, or certainly at not any greater reductions from such prices than would be granted to any large and responsible purchaser in the ordinary course of trade.

"Our reasons for this belief are as follows:

"1—Any attempt on the part of the Government to enforce radically lower prices will have a general unsettling effect on all business, as we must assume that the Government will not discriminate against the steel trade, but will take similar action in all other commodities required for war purposes. It is highly desirable that nothing should be done to disturb confidence in the stability of general trade conditions among business men.

"2—The railroads are demanding an increase of 15 per cent in rates. This probably should be and will be granted, and will involve a corresponding increase in the cost of manufacture.

"3—As is generally known, there have been radical increases in labor rates, so that common labor now is generally paid at the rate of \$3 per day, and all other labor rates in proportion.

"4—Such steel companies as must purchase all or a portion of their raw or semi-finished materials in the open market will probably be required during the last half of this year to pay at least double the average 1916 price, on certain commodities.

"In support of this statement you have only to refer to the current quotations for coal, coke and manganese alloys."

## Lake Ore Movement Far Short of Last Year's

Shipments of iron ore from the Lake Superior region in April were the lowest in the last three years, as shown by the following table:

	April, 1915	April, 1916	April, 1917
Escanaba .....	49,307	398,214	190,407
Marquette .....	4,438	53,258	.....
Ashland .....	43,949	147,852	.....
Superior .....	87,175	211,340	21,125
Duluth .....	174,989	538,281	.....
Two Harbors .....	143,974	309,466	.....
Total .....	503,832	1,658,411	211,532
Decrease from 1916 .....			1,446,879

The decrease from the movement of April last year is nearly 1,500,000 tons, or 87.24 per cent, and the shipments this year are also less than half of those in 1915.

A paper on iron pipe corrosion is to be read on Thursday evening, May 10, before the Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y., by Harry Y. Carson, Central Foundry Company, New York. The author plans to discuss among other things the theories of corrosion, the structure of cast and rolled iron and the mechanical theory of pipe deterioration.

## Pittsburgh and Nearby Districts

James A. Campbell, president of the Youngstown Sheet & Tube Company, Youngstown, Ohio, states that his company during April was unable to produce within 10,000 tons of steel of its monthly capacity, while its shipments in April were 17,000 tons less than in March, both due almost entirely to the shortage in cars, and partly to inferior quality of coal, which in turn affects the quality of coke. Mr. Campbell suggests that during the present shortage in cars and motive power the railroads would do well to discontinue a number of passenger trains and use the motive power released in moving freight. He also advocates an advance in passenger rates, which he says would be only fair to the railroads. The Youngstown Sheet & Tube Company is making plans to develop its coal lands in Greene County, Pa. The Dravo Construction Company, Pittsburgh, has been given certain contracts covering the sinking of shafts and some other work, preliminary to the opening up of its coal territory. The company also has under way plans for building houses for employees when the coal lands have been opened, but nothing definite will be done in this direction for possibly a year.

The capital stock of the Trussed Concrete Steel Company, Youngstown, will probably be increased from \$3,000,000 to \$3,500,000 at a special meeting of stockholders to be held in its main office at Detroit, May 16. Julius Kahn, president of the company, states that its 1916 business was 100 per cent larger than in 1915, and that business for 1917 promises to be at least 50 per cent heavier than last year. He states the company has erected warehouses in several large cities for the purpose of more easily and promptly delivering material to customers.

The Hyde Park Foundry & Machine Company, Hyde Park, Pa., has received orders for six hot sheet mills, four roughing mills, six cold mills, three squaring shears and a roll lathe for shipment to the Liberty Steel Company at Niles, Ohio.

James H. Grose, general manager of the Youngstown district of the Carnegie Steel Company, states that plans to erect 18 welfare buildings at the Ohio works have been completed. These buildings will be constructed of brick, about one-half of the group being two stories, and each will contain a lunch room, shower baths, lockers and a dressing room for the employees. The dimensions of each building to be distributed among the plants will be 27 x 65 ft., all fire-proof throughout.

The Youngstown Club, whose membership is largely composed of wealthy iron and steel manufacturers, has decided to close its bar until the end of the war. The action was taken voluntarily, and becomes effective May 27.

The suit brought by a stockholder against the Carbon Steel Company, Pittsburgh, to restrain it from paying an extra dividend of 2 per cent on the common stock, has been decided in favor of the company. Checks for the extra dividend have been mailed to the stockholders.

At the office of the H. C. Frick Coke Company in Uniontown, Pa., notice was given last week that thousands of vacant lots, owned by the Frick Company in Allegheny, Westmoreland and Fayette counties, will be turned over to the general public for cultivation free of charge. The public, as well as employees of the company, will be furnished land to be cultivated as they see fit upon application at the Scottdale office of the company, or to any of the superintendents of the various plants.

Ten new hot mills being added to the Shenango works, at New Castle, Pa., and to the Farrell works, Farrell, Pa., of the American Sheet & Tin Plate Company, were expected to be ready for operation by July 1, but will not be ready until Aug. 1, or later. Difficulty in securing material and labor is requiring longer time to complete the mills than expected. At the Gary, Ind., plant, which will have 12 double hot tin mills, having an output equal to 24 single mills, the plant is now operating to nearly two-thirds capacity.

## WAGES ARE STILL ADVANCING

### Numerous Employers' Schedules—Some Bonuses Announced

The Timken Roller Bearing Company, Canton, Ohio, placed a new wage scale and profit-sharing plan in effect May 6, under the terms of which all male employees over 21 years of age in its roller bearing factory, tube mill and office will receive a minimum of \$4 a day in wages and profits for an 8-hr. day. The 8-hr. day will go in effect June 3. Male employees under 21 years old will be paid higher wages but will not participate in the profit-sharing plan until they reach the age of 21. Women employed in the plant and office will receive a minimum wage of \$2 for an 8-hr. day, but will not participate in the profits. It is stated that all employees will receive more pay for the 8-hr. day than they are now getting for the 10-hr. day. Employees showing increased efficiency and good records will receive advances in their pay from time to time above the rate at which they start under the plan. Under the new plan, all overtime rates, piecework, premium work, bonus and tonnage rates will be eliminated. Each employee will be given a new hour rate based on his record during the past six months and for the month of May. New men employed after April 28 will be rated according to their skill and experience, but will not participate in the profits until they have been employed six months and otherwise qualify. With the reduction of the working day from 10 to 8 hr. some of the departments will be operated on three shifts.

The Traylor Engineering & Mfg. Company, Allentown, Pa., has announced an increase of 10 per cent. Mr. Traylor, whose company manufactured a very large amount of munitions on orders which he received in person from Lord Kitchener while in Europe at the beginning of the war, states that the increase is granted as a concession to the increasing cost of living in spite of the fact that the price on materials for contracts has increased 30 per cent and that the company stands to lose money on them. He accordingly appeals to the workmen to be sober and efficient that the company may come out as nearly even as possible in the filling of the contracts already taken.

The American Forge & Machine Company, Canton, Ohio, has granted a 10 per cent increase in wages in all departments, making a total increase of 30 per cent during the past year in addition to the placing in effect of a bonus system.

F. E. Myers & Bro., Ashland, Ohio, have granted their employees a 7½ per cent increase in wages, both for day and piece work.

J. B. Clow & Sons have granted a 10 per cent increase in wages to the employees of their Coshocton, Ohio, plant.

The Allis-Chalmers Mfg. Company and several other large employers of Milwaukee and vicinity, which on Jan. 1 instituted a 10 per cent bonus system for an indefinite period, voluntarily increased the wages of employees on May 1 by 10 per cent. The increased wage does not affect the bonus payments. More than 5000 workmen in the Allis works at West Allis and Milwaukee benefit by the advance, which is not individual, but horizontal. While no fixed rate of advance is mentioned, it is understood that machinists will receive an increase of 2c. per hr., and laborers 3c. per hr. The entire increase is based on individual merit.

The fourth advance in wages in the last year has been made at the Elwood, Ind., plant of the American Sheet & Tin Plate Company, where more than 2000 employees are on the payroll. The hot mill force gets an increase of 8 to 15 per cent and employees in all other departments an increase of 10 per cent. The company is advertising for several hundred more employees.

The Arcade File Works, Anderson, Ind., will give its 750 employees a bonus of 10 per cent of their wages every four weeks, to help them meet the higher cost of living.

## CONTENTS

Machinery and Steel Plant Labor.....	1126
Amalgamated Association Convention .....	1128
Special Coal-Handling Gantry Crane.....	1129
Stellite for Metal Cutting.....	1129
New Storage Battery Industrial Truck.....	1129
Australia's Tin Plate Supplies.....	1129
Renewing Worn Rails by Rerolling.....	1130
Toggle Automobile Rail Forming Press.....	1131
New Sidelights on Electric Steel Making.....	1132
The Manufacture of War Munitions.....	1134
Drilling Machine Tapping Attachment.....	1140
Promoting Engineering Publicity.....	1140
Making Munitions to European Standards.....	1141
Electric Process for Small Steel Castings.....	1144
Progress of the Electric Steel Industry.....	1146
Iron and Steel Products Defy Submarines.....	1148
Tariff Rates Revised .....	1149
Editorials:	
A. Time to Be Fair to Industry.....	1150
Dangerous War Legislation .....	1150
Getting Rolling Stock for Europe.....	1151
Efficiency in Munition Factories.....	1152
Machine Tool and Engineering Meeting at Cincinnati.....	1152
No Government Engrossment of Steel Output.....	1153
Government Purchasing at Market Prices.....	1154
Lake Ore Movement Far Short of Last Year's.....	1154
Pittsburgh and Nearby Districts.....	1154
Wages Are Still Advancing.....	1155
New Plate Mills .....	1155
Iron and Steel Markets.....	1156
Steel Companies Subscribe to Liberty Loan.....	1168
Free Movement of Scrap Threatened.....	1168
Ore Advance Not Allowed.....	1168
Iron and Industrial Stocks .....	1168
New Low-Phosphorus Pig-Iron Producer.....	1168
Finished Iron and Steel Prices, Pittsburgh.....	1169
Metal Markets .....	1170
Personal .....	1171
Chicago Machinery Club Making Rapid Progress.....	1172
Iron and Steel Institute Directors.....	1172
Obituary .....	1172
Machinery Markets and News of the Works.....	1173

## NEW PLATE MILLS

### Brier Hill Steel Co. Will Erect Two at Its Youngstown Plant

The Brier Hill Steel Company, Youngstown, Ohio, which heretofore has been a producer only of pig iron, billets and sheet bars, and black and galvanized sheets, has decided to erect two plate mills. One of these will be a 32-in. x 84-in. tandem mill which will roll plates up to 72 in. wide and the other a 38-in. x 132-in., 3-high mill, which will roll plates up to 120 in. wide. Contracts for these mills and the other necessary equipment have been placed with the United Engineering & Foundry Company, Pittsburgh, and it is hoped to have the mills ready for operation in 10 months to a year from the time active work is started. While Youngstown is a very large producer of raw steel, and makes nearly all forms of finished steel in large quantities, its output of plates heretofore has been limited. The Youngstown Sheet & Tube Company has a 27-in. universal plate mill, and the Youngstown Iron & Steel Company, owned by the Sharon Steel Hoop Company, Sharon, Pa., has a 72-in. mill, which has been idle a long time, but which will be started in about a month. The Republic Iron & Steel Company also has a plate mill capable of rolling plates up to about 72 in. wide.



# Iron and Steel Markets

## LARGE STEEL PROGRAM

### But Government Plans Are Exaggerated

#### Indications That Later Purchases Will Be at Nearer to Market Prices

The hysterical reports from Washington of a \$1,000,000,000 outlay for an American merchant fleet, the "diversion to Government uses of the products of every steel mill in the country" and the cancellation of existing contracts between the mills and private buyers have given some concern to manufacturing consumers. The fact is that no such drastic action has been determined upon and it is not improbable that the needs of the Shipping Board will be met by the voluntary action of the steel trade.

It is certain that under the new Shipping Board program for meeting the submarine peril as quickly as possible, plate and structural mills must furnish in the next year more than the 610,000 tons already arranged for by the Government; but that would not mean of necessity a wholesale cancellation of present orders even in those two lines. At the same time it is becoming plainer that the enlarged merchant vessel program, the needs of the Army and Navy, and the much greater demands of this country's Allies will cause more or less readjustment of output and a greater concentration on war material.

Indications increase that the mistake of forcing contracts on steel manufacturers at prices so low as seriously to disturb the industry will not be repeated in the large buying yet to be done by the joint action of the Government and its Allies.

One of these is the placing of over 25,000,000 lb. of spelter by the Government at much smaller concessions from the market than were made on steel. On prime Western spelter the Government paid 9c., as against a market of 9 $\frac{1}{8}$ c. to 9 $\frac{1}{4}$ c. to-day. Much larger spelter orders are to be placed and on these higher prices are expected.

The steel trade has been putting forth every effort to meet Government requirements as fast as these have developed, but the uncertainties are many and are not being cleared up, hence steel mills, particularly those rolling plates, shapes and bars, can entertain new business in only a limited way.

Some building work is held up in which it is undetermined whether the Government or the manufacturing consumer is to buy the steel from the mill. The result is confusion as to prices. In one case, a 50,000-ton billet inquiry has appeared, said to be for Government work, but producers will not seriously consider it until it actually has a Washington origin.

An unusual inquiry for the Allies is for 12,000 tons of wire nails. Two sets of prices prevail in the wire trade, as the leading producer is still selling to its customers at \$6 less than the level established by the last advance.

In exports, a 10,000-ton sale of oil-country pipe and supplies to Burmah, India, is of interest, the

order going to the National Tube Company. France is again in the market for rails, this time for 20,000 tons.

The Government has taken bids on 2000 tons of structural steel for Florida hangars. Ultimate buying for similar structures, according to a Washington estimate, may exceed 100,000 tons. At 30 tons per hangar this represents an ambitious program. The Government's inquiries for a machine shop and foundry at Norfolk Navy Yard amount to 5200 tons.

Pig iron holds steadily to its upward march. On Southern foundry iron the advance for this year's delivery is \$1, or to \$38, Birmingham, for No. 2, and in the Chicago market iron for first half of 1918 is \$2 higher, or \$40, closing half the gap that has existed between 1917 and 1918 prices. The leading maker of agricultural machinery has bought heavily against requirements of 25,000 tons for this year. Foundries keep up the buying for 1918, with no signs yet of a halt in the course of prices.

In the Central West 35,000 to 40,000 tons of basic iron have been taken by an Ohio steel company at \$40, Valley furnace, and a later 5000-ton sale on an inquiry for 20,000 tons from southern Ohio has established a price of \$42, Cleveland, representing an advance of \$2. Bessemer iron is \$1 higher, sales having been made at \$44 at furnace.

Coke contracting is not encouraged by the fact that it gives no guaranty of supply, yet about 50,000 tons of furnace coke for the last half is before the market. Producers are willing to close at \$8, but furnaces are not quick to tie up on that basis.

The late opening of the vessel season has been a serious handicap to Lake Superior iron-ore shippers. To-day the movement is probably 3,000,000 tons behind last year's to May 10, 1,400,000 tons of this shortage belonging to April. By June 1, from the present outlook, the total may be 5,000,000 tons behind that of 1916, an amount not likely to be made up.

## Pittsburgh

PITTSBURGH, PA., May 8, 1917.

There seems to be no end to the advances in prices, and predictions are that the market on practically everything will go still higher. In the week, Bessemer iron has sold for the second half at \$44, an advance of \$1 per ton over last week, and basic iron at \$42, or \$2 higher than a week ago. Prices on finished iron and steel showed no material changes, but are very strong and likely to advance at any time. Coke is slightly firmer, due to a falling off in the supply of cars, and the belief is stronger now that the best grades of blast furnace coke may sell at very close to \$8, at oven, on contracts for last half of the year delivery. Open-hearth sheet bars have sold in one or two cases at \$90, at mill, for shipment over the next two or three months. The scrap market is only fairly strong, but there has been considerable movement in low-phosphorus melting stock and also in borings, the Carnegie Steel Company having bought about 15,000 tons of the latter at \$15 and \$15.50 delivered. Sheets and tin plate are ruling very strong, with stock tin plate selling as high as \$9 per base box and galvanized sheets no less than 8.50c. and 9c. for fairly prompt delivery. There is no sign

## A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	May 9, 1917.	May 2, 1917.	April 11, 1917.	May 10, 1916.
No. 2 X, Philadelphia...	\$42.50	\$42.50	\$41.00	\$20.50
No. 2, Valley furnace...	42.00	42.00	40.00	18.50
No. 2, Southern, Cin'ti...	<b>40.00</b>	39.90	37.90	17.90
No. 2, Birmingham, Ala.	<b>38.00</b>	37.00	35.00	15.00
No. 2, furnace, Chicago*	42.00	42.00	39.00	19.00
Basic, del'd, eastern Pa.	38.00	38.00	38.00	20.50
Basic, Valley furnace...	<b>42.00</b>	40.00	40.00	18.00
Bessemer, Pittsburgh...	<b>44.05</b>	43.95	42.95	21.95
Malleable Bess., Ch'go...	42.00	42.00	39.00	19.50
Gray forge, Pittsburgh...	<b>40.95</b>	39.95	37.95	18.70
L. S. charcoal, Chicago...	46.75	46.75	38.75	19.75

Rails, Billets, etc., Per Gross Ton:	May 9, 1917.	May 2, 1917.	April 11, 1917.	May 10, 1916.
Bess. rails, heavy, at mill	38.00	38.00	38.00	33.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	35.00
Bess. billets, Pittsburgh	80.00	80.00	75.00	45.00
O.-h. billets, Pittsburgh	80.00	80.00	75.00	45.00
O.-h. sheet bars, P'gh...	80.00	80.00	77.50	45.00
Forging billets, base, P'gh	105.00	105.00	100.00	69.00
O.-h. billets, Phila...	75.00	75.00	70.00	50.00
Wire rods, Pittsburgh...	85.00	85.00	85.00	60.00

### Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	4.159	4.159	3.659	2.659
Iron bars, Pittsburgh...	3.75	3.75	3.50	2.60
Iron bars, Chicago...	3.25	3.25	3.25	2.35
Steel bars, Pittsburgh...	4.00	4.00	3.75	3.00
Steel bars, New York...	<b>4.160</b>	3.919	3.919	3.169
Tank plates, Pittsburgh...	6.50	6.50	5.75	3.75
Tank plates, New York...	6.669	6.669	5.919	3.919
Beams, etc., Pittsburgh...	4.00	4.00	3.75	2.60
Beams, etc., New York...	4.419	4.419	3.919	2.769
Skelp, grooved steel, P'gh	3.50	3.50	3.50	2.35
Skelp, sheared steel, P'gh	5.50	5.50	5.50	2.45
Steel hoops, Pittsburgh...	4.25	4.25	4.25	3.00

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	May 9, 1917.	May 2, 1917.	April 11, 1917.	May 10, 1916.
Cents.	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	6.50	6.50	5.50	2.90
Sheets, galv., No. 28, P'gh	8.00	8.00	7.25	5.00
Wire nails, Pittsburgh...	3.50	3.50	3.20	2.50
Cut nails, Pittsburgh...	3.75	3.75	3.75	2.50
Fence wire, base, P'gh...	3.45	3.45	3.15	2.45
Barb wire, galv., P'gh...	4.35	4.35	4.05	3.35

### Old Material, Per Gross Ton:

Iron rails, Chicago...	\$32.50	\$32.50	\$31.00	\$18.00
Iron rails, Philadelphia...	34.00	34.00	31.00	20.00
Carwheels, Chicago...	<b>24.25</b>	24.00	24.00	13.00
Carwheels, Philadelphia...	27.00	27.00	25.00	17.00
Heavy steel scrap, P'gh...	28.00	28.00	30.00	17.25
Heavy steel scrap, Phila...	25.00	25.00	25.00	17.00
Heavy steel scrap, Ch'go	27.00	27.00	27.00	16.00
No. 1 cast, Pittsburgh...	24.00	24.00	24.00	16.25
No. 1 cast, Philadelphia	28.00	28.00	26.50	17.50
No. 1 cast, Ch'go (net ton)	21.50	21.50	20.25	12.50
No. 1 RR. wrot, Phila...	41.00	41.00	35.00	23.00
No. 1 RR. wrot, Ch'go (net)	31.00	31.00	29.50	16.75

### Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	<b>\$7.50</b>	\$7.00	\$8.00	\$2.25
Furnace coke, future...	<b>7.50</b>	7.00	8.00	2.50
Foundry coke, prompt...	<b>8.50</b>	8.50	10.00	3.25
Foundry coke, future...	9.00	9.00	9.00	3.25

### Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	31.00	31.00	33.00	29.00
Electrolytic copper, N. Y.	31.00	31.00	33.00	28.50
Spelter, St. Louis...	9.12½	9.25	10.00	16.75
Spelter, New York...	9.37½	9.50	10.25	17.00
Lead, St. Louis...	<b>10.25</b>	9.75	9.15	7.37½
Lead, New York...	<b>10.45</b>	9.87½	9.35	7.50
Tin, New York...	<b>59.37½</b>	58.50	54.62½	49.75
Antimony (Asiatic), N. Y.	25.00	32.50	36.00	35.00
Tin plate, 100-lb. box, P'gh.	<b>\$8.50</b>	\$8.00	\$8.00	\$5.00

anywhere of weakening in prices, but on the contrary everything points to still higher pig iron, semi-finished steel and finished material.

**Pig Iron.**—Demand for Bessemer and basic pig iron has been very active in the past week, and some heavy sales have been closed. The United Alloy Steel Corporation, Canton, Ohio, has bought 25,000 to 30,000 tons of basic iron, deliveries in the last quarter of this year and first quarter of 1918, at \$40, Valley furnace. One pig-iron interest took 15,000 tons of this business. A western Ohio open-hearth steel plant that has blast furnace affiliations is in the market for 20,000 tons of basic iron, but so far has been able to close for only 5000 tons, taking this amount from a Cleveland furnace interest at \$42 ton at furnace, with a freight rate to point of delivery of \$1.94 a ton. This is the first large lot of basic pig iron that has sold at this price. Most local sellers are quoting basic iron at \$43 at furnace. The Central Steel Company, Massillon, Ohio, is in the market for 10,000 tons of basic, and the Whitaker-Glessner Company for 5000 tons for delivery to its open-hearth plant at Portsmouth, Ohio. In Bessemer iron, there have been sales at \$43 and also at \$44, the higher price in the last two or three days on two lots, one of 2000 tons and another of 1500 tons, the latter for delivery in the last quarter. Bessemer iron is now firmly held at \$44, and some sellers are asking \$45 and expect to put through sales this week at that price. There has been a heavy demand for malleable Bessemer iron, and sales have been closed lately for 15,000 to 20,000 tons at \$41 and \$42, Valley furnace. On small lots of No. 2 foundry iron, \$43 is being paid, and on contracts for the second half of the year, the market is very strong at \$42, Valley furnace. Some large local consumers of foundry iron are not fully covered for the second half, and a brisk buying movement is expected within a short time. An inquiry is reported from Italy for 10,000 tons of Bessemer iron, but local dealers say they will not figure on it. We now quote standard Bessemer iron at \$44; basic, \$42; No. 2 foundry for delivery over remainder of this year, \$42; small lots

for prompt shipment, \$43; and for first half of 1918, \$40; malleable Bessemer, \$42; and gray forge, \$40, all f.o.b. cars, Valley furnace. The freight rate for delivery in the Cleveland and Pittsburgh districts is 95c. per ton.

**Billets and Sheet Bars.**—It is claimed that several fairly large lots of open-hearth sheet bars have sold at \$90, makers' mill, but these sales have not been verified. New demand for steel is only fairly heavy, consumers being well covered and getting fairly good deliveries. Considerable business has been done in the sale to large steel mills of ingots, which are selling at about \$65 per ton, delivered. We note a sale of 800 tons of discard steel at \$40 per ton, delivered at buyer's mill. It is not believed any more Bessemer or open-hearth billets or sheet bars could be had at \$80, except to regular customers and from regular sources of supply. We quote soft Bessemer and open-hearth billets and sheet bars at \$80 to \$85 per ton, maker's mill, Pittsburgh or Youngstown, and forging billets \$100 to \$110 for sizes up to but not including 10 x 10 in. and for carbons up to 0.25 per cent.

**Ferroalloys.**—Fresh demand for ferromanganese is not very active, consumers evidently being covered on contracts and getting fairly satisfactory deliveries. Reports of sales of 80 per cent ferromanganese at \$500 per ton and higher are not credited. We note one sale of 100 tons of 80 per cent domestic ferromanganese at \$400 per ton, delivered, and there have been numerous sales of carload lots and up to 100 tons at \$425, delivered. As noted last week, no English 80 per cent ferromanganese is being shipped to the United States except for delivery to steel mills that are making munitions for the Allies. We quote 80 per cent domestic ferromanganese at \$400 to \$425 per gross ton, delivered. The famine in supply of 50 per cent ferrosilicon still exists, and small lots are being sold at \$200 to \$250 delivered. Spiegeleisen continues to sell at about \$4 per point, and we quote 18 to 22 per cent at \$75 to \$80 and 25 to 30 per cent at \$100 to \$110, delivered. We quote 9 per cent Bessemer ferrosilicon at \$64, 10 per cent \$65, 11 per



cent \$67, 12 per cent \$70, 13 per cent \$75, 14 per cent \$80, 15 per cent \$85, and 16 per cent \$90. We quote 7 per cent silvery iron at \$46 to \$47; 8 per cent, \$47 to \$48; 9 per cent, \$49 to \$50; 10 per cent, \$50 to \$51, and 11 and 12 per cent, \$52 to \$53, all f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., these furnaces having uniform freight rates of \$2 per ton for delivery in the Pittsburgh district.

**Structural Material.**—Inquiry in the past week has been more active, and some fairly large jobs have been placed. The American Bridge Company has taken 800 tons of bridge work for the Pennsylvania Railroad, 1500 tons for an addition to a hotel in Cleveland, Ohio, and 300 tons for an extension to the open-hearth steel plant of the Donner steel plant at Buffalo, N. Y. The McClintic Marshall Company has taken 1600 tons for a machine and electrical shop at the Philadelphia Navy Yard, and 600 tons for an addition to the plant of the National Malleable Castings Company, Cleveland. The Fort Pitt Bridge Works has taken 2500 tons for a power house for the Firestone Tire & Rubber Company at Akron, Ohio. Prices on structural shapes are strong, and mills that can make delivery in four to six months are asking 4c. We quote beams and channels up to 15 in. at 4c. at mill for fairly prompt delivery, while small lots from warehouse bring up to 5c. and higher, depending upon quantity.

**Plates.**—A few small steel car orders came out in the past week. The Pressed Steel Car Company has taken 200 steel mine cars for the Houston Collieries Company, and the Cambria Steel Company 1000 steel hopper cars for its parent company, the Midvale Steel & Ordnance Company. It is said that several fairly large inquiries for steel cars are about ready to come on the market. The situation as regards supply of steel plates seems to be getting more tense. For fairly prompt deliveries prices range from 6c. to 7c. at mill, but there are really no set prices on plates, sales being governed entirely by former relations existing between the buyer and the mill, by the quantity involved and by the deliveries wanted. None of the plate mills is quoting less than 6c. on  $\frac{1}{4}$  in. and heavier sheared plates for delivery in three to four months, while other mills are quoting 7c. and higher for the same deliveries. We therefore quote  $\frac{1}{4}$  in. and heavier sheared plates at 6c. to 7c. at mill for delivery in three and four months, while ship plates are held at 8c. and 9c. at mill. Prices on sheared plates from warehouses have been advanced about \$10 per ton, and we now quote at 8.50c. to 9c., the price depending upon the quantity and delivery involved.

**Steel Rails.**—The advance of \$5 per ton on light rails is now general among all the makers. Owing to lack of steel the Carnegie Steel Company has not been able to operate its No. 3 rail mill at the Edgar Thomson works more than single turn for many months, and this has cut down the normal output of this mill 50 per cent. It is understood that this company is sold up for light rails for all of this year, and has considerable business booked for 1918 delivery. The Cambria Steel Company is about in the same position as regards light rails. Very few orders are being placed for standard sections, and the Carnegie Company is reported sold up for all of this year and practically for all of 1918. We quote angle bars at 2.75c. at mill, when sold in connection with orders for standard section rails, and on carload and smaller lots, 3c. to 3.25c. at mill. We quote light rails as follows: 25 to 45 lb., \$60; 16 to 20 lb., \$61; 12 and 14 lb., \$62; 8 and 10 lb., \$63; in carload lots, f.o.b. mill, with usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38, and open-hearth \$40, per gross ton, Pittsburgh.

**Tin Plate.**—As a result of the conference held in Washington early last week of tin plate manufacturers, can makers, a committee from the wholesale grocers and packers, the tin plate manufacturers have agreed to turn out over the next two or three months every possible pound of tin plate used in making containers for perishable foods. It is believed this will help the situation a good deal and later on the mills will take up the making of tin plate for cans for non-perishable foods. The new demand for tin plate is abnormally heavy, and mills are turning down almost every day

both foreign and domestic business, which is offered at very attractive prices. Some new capacity in tin plate is coming on, but this will not be ready before 90 days. The American Sheet & Tin Plate Company has ten new mills at New Castle and ten at Farrell, Pa., which it hopes to have ready about Aug. 1. The new tin mill of the Bethlehem Steel Company, in Baltimore, is scheduled to be ready for operation about Aug. 1, but its output is sold for some time. Also the new tin mill, at Gary, Ind., of the American Sheet & Tin Plate Company will likely be fully built within the next 90 days. This plant will contain 12 double tin mills, and is expected to turn out as much product as 24 single mills. Prices on current orders for tin plate from stock are higher, and we now quote 14 x 20 in. at \$8.50 to \$9 for stock primes, and on wasters about 25c. less per box. Tin plate makers report they are being deluged with inquiries for tin plate from concerns to which they have never sold before, this indicating that these consumers are not getting their full supply from regular sources. We quote long terne plate, No. 28 gage base, at \$7.25 to \$7.50; short terne plate, \$12 to \$12.50, maker's mill, prices depending on quantity and delivery wanted. The present schedule of prices on terne plate is as follows: 8-lb., 200 sheets, \$14 per package; 8-lb., 214 sheets, \$14.30 per package; 12-lb., I. C., \$15.25 per package; 15-lb., I. C., \$15.75 per package; 20-lb., I. C., \$16.50; 25-lb., I. C., \$17.25; 30-lb., I. C., \$18; 35-lb., I. C., \$18.75; 40-lb., I. C., \$19.50.

**Cotton Ties.**—As yet local makers have not given much thought to prices on cotton ties for this season, and the new prices may not be announced for a month or six weeks. Some unusual conditions prevail this year, and the price may not be so high as expected. The season opened last year with the price of cotton ties at \$1.35 per bundle of 45 lb., while the price in 1915 was 85c. per bundle. The price for the 1917 season will be higher than last year, but the advance promises not to be very heavy.

**Sheets.**—New demand is abnormally heavy, and very high prices are being paid for black and galvanized sheets for fairly prompt shipments. Several leading mills are holding No. 28 gage Bessemer black sheets at 7c. for Bessemer stock, and 7.25c. for open-hearth stock. Sales have been made for fairly prompt shipments at as high as 8c. per lb. On galvanized sheets, sales have been made at as high as 9c., heavy premiums having been paid for promise of prompt delivery. It is said that additional heavy orders for various grades of sheets have been placed with Pittsburgh and Youngstown mills by the Government, but details of these orders have not been given out. We now quote blue annealed sheets, Nos. 3 to 8 gage, at 5.50c. to 6c.; box-annealed one-pass Bessemer, cold rolled, No. 28 gage, 6.50c. to 7c. at mill. Prices on No. 28 gage galvanized range from 7.50c. to 8c., and on No. 28 black plate, tin mill sizes, 6.50c. to 7c., all f.o.b. mill, Pittsburgh. These prices are for carload and larger lots for forward delivery. For prompt delivery, premiums of from \$5 to \$10 per ton would have to be paid.

**Iron and Steel Bars.**—Inquiry for both iron and steel bars is heavy. Prices on steel bars have now reached about 4c. at mill, but several leading makers are still quoting 3.75c. to regular customers, for such deliveries as they can make. Specifications are heavy, and the product of the steel and iron bar mills is well sold up over the remainder of this year. Mills report demand for reinforcing steel bars as quite heavy from certain sections where building is more active. We quote steel bars at 3.75c. to 4c. at mill for forward delivery and 4.50c. or higher in small lots from warehouse for prompt shipment. We quote refined iron bars at 3.75c. and railroad test bars at 3.90c. to 4c. at mill in carload and larger lots.

**Wire Nails.**—The new demand for wire nails is still heavy, and some makers report they have sold wire nails for delivery within the next 60 days at \$3.75 base, per keg, an advance of 25c. over the regular price. There is a shortage in the supply of wire nails, especially in sizes most commonly used. The new demand for barb and plain wire is also very heavy, and mills



are filled up for some months ahead. There is still some export demand for wire, but local makers are not quoting on this, not having the wire to spare. A local jobber has sold a fairly large quantity of wire nails for export for which it is stated he obtained \$4.25, base, per keg, an advance of 75c. per keg over what is regarded as the official price. Prices now in effect to the large trade by all the mills are as follows: Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$3.55 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.45; galvanized wire, \$4.15; galvanized barb wire and fence staples, \$4.35; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 48 per cent off list for carload lots, 47 per cent off for 1000-rod lots, and 46 per cent off for small lots, f.o.b. Pittsburgh.

**Wire Rods.**—Mills report the new demand for wire rods as abnormally heavy, and say they are turning down orders nearly every day at very attractive prices, as they cannot make the deliveries wanted, and, in fact, have not the rods to spare for any delivery. A Youngstown, Ohio, mill recently sold about 1500 tons of soft open-hearth rods at \$90 at mill. High carbon rods made from acid open-hearth steel have sold for Eastern delivery at \$115 per gross ton, at mill. We note a sale of 500 tons of high carbon rods made for special steel at \$100 per ton at mill. We quote soft Bessemer and open-hearth rods to domestic consumers at \$85 to \$90; high-carbon rods made from ordinary open-hearth steel, \$90 to \$100, and special steel rods, with carbons running from 0.75 to 0.90, \$100 to \$115 at mill.

**Hoops and Bands.**—Most consumers are covered over second and third quarters, and most of the larger users over the entire year. On current orders for fairly prompt delivery, steel hoops are holding at 4.25c. to 4.50c. or higher and steel bands at 3.75c. to 4c., extras on the latter as per the steel bar card.

**Nuts and Bolts.**—The new demand is fairly heavy, but most consumers are covered over this quarter, and some for the remainder of this year. Specifications are coming in freely, but deliveries of steel by the mills are very unsatisfactory, and makers of nuts and bolts are back in shipments six to eight weeks or longer. There is a heavy export demand for nuts and bolts, mostly from Norway and Sweden, and also South America, but local makers say they are not quoting, as it is hard to get cars for export shipments, and still harder to get bottoms. The result is great delay in making export shipments, and very often orders placed are cancelled. Discounts in effect are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days. We quote:

Carriage bolts, small, rolled thread, 40 per cent; small, cut thread, 35 and 2½ per cent; large, 25 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 per cent; large, 30 per cent.

Machine bolts, c. p. c. and t. nuts, small, 30 per cent; large, 20 per cent. Bolt ends, h. p. nuts, 30 per cent; with c. p. nuts, 20 per cent. Lag screws (cone or gimlet point), 45 per cent.

Nuts, h. p. sq., blank, \$2.10 off list, and tapped \$1.90 off; hex., blank, \$1.90 off, and tapped, \$1.70 off; nuts, c.p.c. and t. sq., blank, \$1.70 off, and tapped, \$1.50 off; hex. blank, \$1.60 off, and tapped, \$1.40 off. Semi-finished hex. nuts, 50 and 10 per cent. Finished and case-hardened nuts, 50 and 10 per cent.

Rivets 7/16 in. in diameter and smaller, 40 per cent.

**Railroad Spikes and Track Bolts.**—The Louisville & Nashville Railroad has bought 25,000 kegs of railroad spikes for delivery over four or five months, and is said to have paid the full price of \$3.85 base, f.o.b. Pittsburgh. Makers report that the new demand for spikes and track bolts is only fairly heavy. Railroads are not doing much at present in the way of laying new trackage, but are holding back specifications on contract. Prices are very firm, and several makers say that if they cannot sell railroad spikes at the present price of

\$3.85 base, they will put the steel into other materials, for which they can get very attractive prices. We quote track bolts with square nuts at 5.35c. to 5.50c. to railroads and 5.50c. and up to 7c. and 8c. in smaller lots for prompt shipment. Railroad spikes, 9/16 in. and larger, are \$3.85, base; 7/16 and ½ in., \$3.95, base; 5/16 and ¼ in., \$4.20, base. Boat spikes are \$4.10, base, all per 100 lb., f.o.b. Pittsburgh.

**Rivets.**—The new demand is fairly active, but most consumers are covered over second and third quarters, and some over the entire year. Buyers are specifying freely, but deliveries of the steel by the mills are bad, and this is keeping down output of nuts and bolts. There is a good deal of export inquiry, on which local makers say they are not quoting. We quote buttonhead structural rivets, ½ in. in diameter and larger, \$4.75 per 100 lb., base, and conehead boiler rivets, same size, \$4.85 per 100 lb., base, f.o.b. Pittsburgh. These prices are only for delivery up to July 1. Terms are 30 days net, or ½ of 1 per cent off for cash in 10 days.

**Cold Rolled Strip Steel.**—The new demand is not very active, as most consumers are covered over this quarter, and a few of the larger users through the next quarter. Mills have not formerly opened their books for third quarter delivery, but are being importuned by the trade to do so. All the makers of cold-rolled strip steel are very much behind in deliveries, and some have shipped out very little material for second quarter delivery, not having yet cleaned up first quarter orders. Prices are firm. We quote on current orders 7.50c. to 8c. at mill, for delivery to July 1. Terms are 30 days net, less 2 per cent for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

**Wrought Pipe.**—The United States Steel Products Company recently took an order for about 10,000 tons of oil country goods for shipment to India. All this material will be furnished by the National Tube Company. As yet the National Tube Company has not advanced its prices on steel pipe in line with the action taken by independent mills early last week, but may do so shortly. The demand for lap weld iron and steel pipe is still very heavy, especially from oil and gas companies which are trying to place pipe lines, but find the mills sold up so far ahead they cannot make delivery on gas or oil lines until very late this year, and some are refusing to quote entirely. On butt weld sizes of iron and steel pipe, mills can make deliveries in eight to 12 weeks from date of order, depending on sizes and quantity. Discounts in effect on iron and steel pipe from May 1, 1917, are given on another page.

**Boiler Tubes.**—Mills are sold up over the remainder of this year, and orders for both iron and steel tubes have been placed for delivery in first quarter and first half of 1918. One leading maker of seamless steel tubing reports being sold up on all it can make over all of this year, and through 1918 as well. Actual prices being obtained on iron and steel tubes are anywhere from \$10 to \$25 per ton higher than indicated by the nominal discounts in effect. The nominal discounts on iron and steel tubes are given on another page.

**Shafting.**—Makers report that specifications are coming in very freely, while new demand is fairly heavy. Most consumers are covered over the next four to five months and some for the entire year. We quote cold rolled shafting at 15 to 5 per cent off list, the larger discount being named only to a very few of the heaviest buyers.

**Old Material.**—The local market is quiet as regards actual sales, about the only movement being for low-phosphorus melting stock and cast-iron borings. Awards were to have been made on the Pennsylvania Railroad scrap on Friday, May 4, and one report has it that several bids of as high as \$30.50 f.o.b. cars, Altoona, on the heavy melting steel scrap failed to get it. The Carnegie Steel Company came in the market in the past week and bought about 15,000 tons of cast-iron borings at \$15 to \$15.50, delivered. These heavy purchases have firmed up the market very much on borings, and prices are at least \$1 per ton higher. There is a heavy demand for low-phosphorus melting stock

and prices are up about \$2 per ton. We note sales of about 6000 tons of this scrap at \$40 or higher and one sale of 800 tons at \$40, all delivered at buyers' mills. The local scrap market continues quiet, and prices are not very firm. It is said that one large consumer at Monessen is not offering above \$26.50 for heavy melting scrap and that it could be readily obtained at not above \$28, delivered. Their supply was not so good last week, and delays in shipments of scrap were more numerous than for some time. Prices for delivery in Pittsburgh and at other consuming points that take Pittsburgh freight rates, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered .....	\$28.00
No. 1 foundry cast .....	\$24.00 to 25.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa. ....	34.00 to 35.00
Hydraulic compressed sheet scrap .....	22.00 to 23.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district .....	19.00 to 20.00
Bundled sheet stamping scrap .....	17.00 to 18.00
No. 1 railroad malleable stock .....	26.00 to 27.00
Railroad grate bars .....	15.00 to 16.00
Low-phosphorus melting stock .....	40.00 to 42.00
Iron cars axles .....	45.00 to 46.00
Steel car axles .....	45.00 to 46.00
Locomotive axles, steel .....	50.00 to 52.00
No. 1 busheling scrap .....	21.00 to 22.00
Machine-shop turnings .....	13.75 to 14.25
Old carwheels .....	25.00 to 26.00
Cast-iron borings .....	15.00 to 15.50
Sheet-bar crop ends .....	33.00 to 34.00
No. 1 railroad wrought scrap .....	31.00 to 32.00
Heavy steel axle turnings .....	18.00 to 18.50
Heavy breakable cast scrap .....	22.00 to 22.50

**Coke.**—An Eastern consumer is actively in the market for 10,000 to 15,000 tons of high grade furnace coke per month, for last half of this year. One other interest wants 22,000, another 10,000, and a third 7500 tons per month, but as yet nothing has been closed. A leading maker of furnace coke, that has a very high reputation for quality, is holding coke at \$8 per net ton, at oven, for last half delivery. Other makers do not believe the price will be that high, their views of the market for last half being not over \$7 at oven. It is probable that late this month some large contracts for furnace coke will be closed for last half of this year delivery. The new demand for prompt furnace coke is not very active. The supply of cars is fairly good, and consumers are getting better deliveries on coke than for many months. We note a sale of 45 cars of furnace coke for prompt shipment at \$7 per ton at oven, 25 cars at \$7.50, and 4000 tons of high quality furnace coke at \$8 per net ton at oven. One leading maker of foundry coke has renewed all contracts that expire on June 30 for second half of the year delivery at \$9 per net ton at oven, the quantity involved being fairly heavy. We quote best grades of furnace coke for prompt shipment at \$7.50 to \$8, and 72-hour foundry at \$8.50 to \$9 per net ton at oven. We cannot give an accurate price on furnace coke for last half of this year delivery, as none has as yet been sold. We quote best grades of 72-hour foundry coke for last half delivery at \$8.50 to \$9 per net ton at oven. The Connellsville *Courier* gives the output of coke in the Upper and Lower Connellsville regions for the week ending April 28, as 379,778 tons, an increase over the previous week of 20,245 tons. This is the heaviest output of coke in the Upper and Lower Connellsville regions for any one week since April 8, 1916.

## Chicago

CHICAGO, ILL., May 8, 1917.

The entire market in finished steel materials is quiescent because of the determination of the mills to enter no commitments until they learn to what extent the Government will draw upon their output for its war needs. This applies particularly to plates, shapes and bars, although every manner of steel product is likewise affected. The leading interest is making no quotations on the materials named, while less important factors give no prices on plates and shapes. One eastern mill has put its minimum for mild steel bars at 4c., Pittsburgh, and in this connection it may

be noted that of all steel products bars are the most readily obtainable. Premium prices are all that are named on most other products. Meanwhile specifications against contracts are proceeding at a lively rate, and shipments are heavy. Northern No. 2 foundry iron is unchanged at \$42, furnace for the remainder of this year, but for 1918 first-half delivery, the quotation is \$2 higher at \$40, furnace. Buying for both periods has been active, and many melters have yet to cover for 1917. Southern iron is scarce for the remainder of the year, and the quotations of different makers show a wide spread, one, for instance, asking \$38, Birmingham, for 1917 delivery, and another no less than \$44. The old material market is a trifle firmer, but still somewhat indefinite.

**Pig Iron.**—The quotation for first-half Northern iron has been advanced \$2 per ton, the new price being \$40, furnace, for No. 2 foundry, malleable Bessemer and basic. For last-half delivery the quotation is unchanged at \$42, furnace. A large business has been done for delivery this year, and considerable for 1918. Many interests have yet to cover for the remainder of this year, and it is a question whether there will be sufficient iron to go around. The leading manufacturer of agricultural implements has been a heavy buyer against its inquiry for about 25,000 tons of various grades, delivery this year at various plants, and others in the same line are inquiring for tonnages ranging from 1000 to 2000 tons for delivery next year. Buying for the first half includes 1000 tons taken by a sewing machine company, 4000 tons purchased by a maker of plumbing fixtures, 1500 tons by an agricultural implement maker, and 1000 tons by a Rock Island manufacturer. Most of the buying is by manufacturers, as the jobbing foundries show a disposition to proceed slowly, and cover requirements as they are developed by contracts. A large Alabama producer has opened its books for 1918 delivery, and is offering a little iron for the remainder of this year, quoting \$35, Birmingham, for No. 2, for first half, and \$38, Birmingham, for the little it can deliver this year, the latter price being equal to \$42, Chicago. Another Southern maker quotes \$44, Birmingham, for delivery this year alone, but will accept a limited amount of business for last-half delivery at \$40, when 1918 delivery is coupled with it; these prices, of course, being for No. 2. For next year this maker quotes \$36, Birmingham. Throughout the South, the car situation is bad, the assertion being made by one authority that for every three cars sent North, only one car is returned. The week brought an extremely active demand for high-silicon irons ranging all the way from 4 to 10 per cent. Some odd lots of Tennessee silveries have been sold for prompt shipment at \$48 to \$49, Chicago, for 8 per cent., but these are rapidly disappearing. Northern high phosphorus is quoted at \$42, furnace, for the last half, and \$40, for first half. Quotations for Lake Superior charcoal iron are unchanged at \$46.75 to \$48.25, Chicago, according to grade, for 1917, and \$41.75 to \$43.24, Chicago, for 1918. One producer has practically none to sell for this year, and is quoting up to \$50, furnace, or \$51.75, Chicago, for this year. Sales for 1918 delivery have been so heavy that a leading maker has suspended quotations until stocks and possible production are scanned and the outlook predetermined so far as possible. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 1 to 5 .....	\$46.75
Lake Superior charcoal, No. 6 and Scotch .....	48.25
Northern coke foundry, No. 1 .....	42.50
Northern coke foundry, No. 2 .....	42.50
Northern coke foundry, No. 3 .....	41.50
Northern high-phosphorus foundry .....	42.00
Southern coke No. 1 f'dry and 1 soft .....	40.00
Southern coke No. 2 f'dry and 2 soft .....	\$41.00 to 42.00
Malleable Bessemer .....	42.00
Basic .....	42.00
Low phosphorus .....	80.00
Silvery, 8 per cent. ....	50.75
Bessemer ferrosilicon 10 per cent. ....	70.50

**Ferroalloys.**—Eighty per cent ferromanganese for delivery in the latter part of this year is unchanged at



\$400, while prompt is held at \$425 and upward. Bessemer ferrosilicon remains at \$72.54, Chicago, for 12 per cent, and \$70.54 for 10 per cent. The only sure thing about ferromanganese is its scarcity.

**Rails and Track Supplies.**—Some scattered business in track supplies has been done, 1918 deliveries being specified, but no notable activity in rails is reported. Quotations are as follows: Standard railroad spikes, 4c. to 4.10c., base; small spikes, 4.25c. to 4.35c., base; track bolts with square nuts, 5c. to 5.10c., all in carloads, Chicago; tie plates, \$60 to \$70, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open-hearth, \$40; light rails, 25 to 45 lb., \$60; 16 to 20 lb., \$61; 12 lb., \$62; 8 lb., \$63; angle bars, 2.75c., base.

**Structural Material.**—With the leading interest declaring that it has no shapes to sell, and no price to quote, and with other makers likewise declaring they have none to offer, a definite price can hardly be named. Nominally, it may be said to be 4.659c., Chicago, providing indefinite deliveries are acceptable. Meanwhile users are anxious to make contracts and are becoming worried over the situation. Small structural awards are more numerous. They are listed as follows:

Elevator at Council Bluffs, Iowa, for the Chicago & Northwestern Railway Company, 190 tons, to unreported fabricator, 190 tons.

Store and apartment building at Minneapolis for Inter-City Realty & Loan Company, to unreported fabricator, 185 tons.

Punched plates, etc., for 30 tank cars, for the North American Car Company, to Joseph T. Ryerson & Son, 213 tons.

Ten-story apartment building for Dr. M. L. Blatt, Surf Street and Pine Grove Avenue, Chicago (reinforced concrete), 266 tons.

Steel work for buildings E and C of repair shops of Pullman Company at St. Louis, to Kenwood Company, 615 tons.

Randolph Central office building for the Northwestern Telephone Exchange Company at Minneapolis, to Minneapolis Steel & Machinery Company, 193 tons.

Strauss Trunnion bascule bridge over the Elizabeth River at South Front Street, Elizabeth, N. J., for the Great Lakes Dredge & Dock Company, to unreported fabricator, 332 tons.

Highway bridge over Republic River near Fort Riley, Kans., to unreported firm, 151 tons.

Warehouse for the Union Iron Works, San Francisco, to Western Iron Works, 280 tons.

The Rock Island is inquiring for 1680 box car underframes. Jobbers' quotations are unchanged.

We quote for Chicago delivery of structural steel out of jobbers' stocks, 5c.

**Sheets.**—No. 10 blue annealed and No. 28 box annealed are both quoted at 6.689c. to 7.189c., and difficult to obtain because of the over-sold condition of the mills. The quotation for galvanized sheets can only be given in a broad way, some interests declaring there is no fixed price. Nominally No. 28 galvanized ranged from 8.189c. to 9.189c., Chicago. Jobbers ask \$5 per ton more on black sheets, and \$10 per ton more on blue annealed.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 7c.; No. 28 black, 7.50c., and No. 28 galvanized, 9c.

**Rivets and Bolts.**—Manufacturers are busy adjusting contracts for last-half delivery, but are going slow until they ascertain to what extent the Government will draw on them for their products. Mill quotations are without change as follows: Carriage bolts up to  $\frac{3}{4}$  x 6 in., rolled thread, 40; cut thread, 35-2 $\frac{1}{2}$ ; larger sizes, 25; machine bolts up to  $\frac{3}{4}$  x 4 in., rolled thread, with hot-pressed square nuts, 40-10; cut thread, 40; large size, 30; gimlet—point coach screws, 45; hot-pressed nuts, square, \$2.10 off per 100 lb.; hexagon, \$1.90 off. Structural rivets,  $\frac{3}{4}$  to 1 $\frac{1}{4}$  in., 4.75c. to 4.939c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 5c.; boiler rivets, 5.10c.; machine bolts up to  $\frac{3}{4}$  x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to  $\frac{3}{4}$  x 6 in., 40-2 $\frac{1}{2}$ ; larger sizes, 30-5; hot-pressed nuts, square, \$3, and hexagon \$3 off per 100 lb.; lag screws, 50 per cent off.

**Bars.**—An Eastern steel company has advanced its quotation for mild steel bars to 4.189c., Chicago, delivery in the course of 4 to 5 months. At 3.939c., Chicago, it booked a goodly tonnage, and took a few hundred tons at 4.039c., Chicago. Other makers quote mild steel at 3.689c., Chicago, although they have obtained 3.939c. to 4.189c., Chicago, for prompt lots. Hard steel

bars are unchanged at 3.50c., Chicago, while iron bars range from 3.25c. to 3.50c., Chicago. The growing demand for concrete reinforcing bars is leading to a scarcity of hard steel bars, and for small prompt lots 4.25c. has been paid. Meanwhile the price of re-rolling rails continues to advance, up to \$35 having been paid.

We quote prices out of store for Chicago delivery as follows: Soft steel bars, 4.50c.; bar iron, 4c.; reinforcing bars, 4.50c., base, with 5c. extra for twisting in sizes  $\frac{1}{2}$  in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent to plus 10 per cent.

**Plates.**—A majority of the makers, including the leading interest, declare themselves out of the market and assert they cannot quote. One mill has taken business in tank plates, delivery in the last half, at 7c., Pittsburgh, or 7.189c., Chicago, but now names 7.689c., Chicago, as its price for that delivery. Another maker has sold none, but considers 6.689c. to 7.189c. as the market. For shipplates, 9c. and over has been offered. Some jobbers are asking \$10 per ton over others, and an advance in small-lot prices is likely.

We quote for Chicago delivery of plates out of jobbers' stocks, 6.50c. to 7c.

**Wire Products.**—The leading interest continues to hold its quotation about \$6 per ton under the quotations of independent manufacturers, but asserts that this detail is of little consequence in view of its having so little to sell. Its base is unchanged at 3.20c., the quotation for nails, while others quote 3.50c. The quotations of the leading interest, made to jobbers, are as follows per 100 lb.: Plain fence wire, Nos. 6 to 9, base, \$3.339; wire nails, \$3.389; painted barb wire, \$3.539; galvanized barb wire, \$4.239; polished staples, \$3.539; galvanized staples, \$4.239, all Chicago, carload lots.

**Cast-Iron Pipe.**—Business continues light, especially as regards public lettings. Minneapolis awarded 325 tons, May 4, the successful bidder being as yet unreported. Lorain, Ohio, is about to place 80 tons. Quotations are unchanged, as follows, per net ton, Chicago: Water pipe, 4 in. \$58.50; 6 in. and larger \$55.50, with \$1 extra for class A water pipe and gaspipe.

**Old Material.**—The market is slightly firmer, but still more or less unsettled. Railroad shipments are proceeding more evenly, and the dealers are chiefly busy in looking after deliveries. Several railroad lists of goodly size are out, among them one from the Santa Fe offering 3000 to 4000 tons, one from the Wabash, offering 2000 to 3000 tons, another from the Pere Marquette, offering about 1000 tons, and one from the Big Four, offering several thousand tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$32.50 to \$33.50
Relaying rails	39.00 to 40.00
Old carwheels	24.25 to 25.25
Old steel rails, rerolling	34.00 to 35.00
Old steel rails, less than 3 ft.	31.50 to 32.00
Heavy melting steel scrap	27.00 to 27.50
Frogs, switches and guards, cut apart	27.00 to 27.50
Shoveling steel	24.50 to 25.00
Steel axle turnings	17.50 to 18.00

Per Net Ton	
Iron angles and splice bars	\$34.00 to \$34.50
Iron arch bars and transoms	34.50 to 35.00
Steel angle bars	28.50 to 29.00
Iron car axles	41.50 to 42.50
Steel car axles	41.50 to 42.50
No. 1 railroad wrought	31.00 to 32.00
No. 2 railroad wrought	27.50 to 28.50
Cut forge	28.00 to 28.50
Pipes and flues	17.50 to 18.00
No. 1 busheling	19.50 to 20.00
No. 2 busheling	14.50 to 15.00
Steel knuckles and couplers	29.00 to 30.00
Steel springs	30.50 to 31.00
No. 1 boilers, cut to sheets and rings	18.00 to 18.50
Boiler punchings	24.00 to 24.50
Locomotive tires, smooth	38.00 to 38.50
Machine-shop turnings	11.00 to 11.50
Cast borings	11.00 to 11.50
No. 1 cast scrap	21.50 to 22.00
Stove plate and light cast scrap	14.50 to 15.00
Grate bars	15.00 to 15.50
Brake shoes	15.00 to 15.50
Railroad malleable	22.00 to 22.50
Agricultural malleable	18.50 to 19.00

John Nolan, Cambridge, Mass., has been retained by the Youngstown Sheet & Tube Company, Youngstown, Ohio, to plan and develop 238 acres which the company is to devote to a housing project. His work will be completed in a few weeks, after which actual housing work will start.



## Philadelphia

PHILADELPHIA, PA., May 8, 1917.

The steel mills are waiting patiently for the Government to indicate its requirements. Especially is this true of the plate makers who are looking ahead to definite announcement of the Government's shipbuilding program and are reserving space accordingly. Information in the Philadelphia trade is to the effect that shipyards are getting all the materials they can use for Government contracts. One local shipyard this week received a solid trainload (28 cars) of plates from Coatesville plate mills.

**Pig Iron.**—The market is strong and sellers report increasing difficulty in getting foundry grades for prompt shipment. It is understood that the Baldwin Locomotive Works have placed orders at ruling prices against specifications for 5000 tons of Eastern Pennsylvania No. 2 X and 3000 tons of low silicon iron for third quarter delivery. Active inquiry continues for Eastern Pennsylvania foundry, but little of this iron is for sale for the remainder of 1917. Buying for first half of 1918 has continued and sizeable business was done during the week, with some sellers shading the highest quotations. A considerable number of producers, it is estimated in a reliable quarter, have sold from 25 to 50 per cent of output for first half, and at figures a shade under the market. The Virginia situation is virtually unchanged, with only a fair tonnage available and furnaces unwilling to clean up their entire output thus early in the year. A fair sale of Virginia No. 2 X is reported on a basis of \$45, furnace, for prompt shipment. One concern was unable to obtain a price on inquiries aggregating about 9000 tons for early deliveries. A large Virginia interest which has been out of the market for some time has just opened its books for first half on a basis of \$38, furnace, for No. 2 X and \$37.75 for No. 2 plain. The Virginia Iron, Coal & Coke Company is still out of the market. Receipts of Virginia iron at foundries in the local district are suffering from the embargoing of western Maryland by the Norfolk & Western. Quotations on Alabama iron continue to show considerable range and not a great deal of this iron is coming in. Southern furnaces generally are apparently sold up to the limit. Current deliveries are very unsatisfactory. One Alabama interest quotes \$36 on No. 2 foundry for first half shipment. Virtually all makers of standard low phosphorus pig iron are sold up for the remainder of this year and sales are mostly small lots required by old customers. Usual quotations are \$77 to \$78, an advance of about \$2 a ton over last week's minimum. Little inquiry for prompt shipment is noted, but buyers are coming in for next year. Sales of low phosphorus, including some copper-bearing iron, during the week under review amounted to slightly less than 2000 tons at above prices. A small lot of copper-bearing low phosphorus iron was sold, it is understood, at \$80, furnace. The basic market may be said to be marking time, there being scant inquiry just now, and no sales are reported which would test the price situation. Quotations for standard brands delivered in buyers' yards for prompt shipment range about as follows:

Eastern Pa. No. 2 X foundry.....	\$42.50 to \$43.50
Eastern Pa. No. 2 plain.....	42.00 to 43.00
Virginia No. 2 X foundry.....	41.75 to 42.75
Virginia No. 2 plain.....	39.75 to 42.50
Gray forge .....	39.75 to 42.50
Basic .....	38.00 to 40.00
Standard low-phosphorus .....	77.00 to 78.00

**Ferroalloys.**—Uncertainty still dominates the ferromanganese market. Except where consumers are actually engaged on Allied contracts, licenses are not coming through from the British Government, and supplies are virtually restricted to small available lots of domestic alloy. The United States Treasury Department's report gives 1280 tons as the April imports of ferromanganese at this port, for a total value of \$147,109. Usual quotations on domestic are \$400 to \$450 for spot and \$350 to \$400 for future delivery.

**Structural Material.**—So little steel is available for shipment over the remainder of 1917 that mills are loth to quote. Government orders have preference and generally buyers are informed that the mill regrets it is

not in position to quote, being sold up for the rest of the year. No big projects have come into this market recently. One of the largest independents has advanced its minimum price for shapes to 4½c., Pittsburgh, which was done in other quarters some time ago. This concern is making shipment of small special lots from stock on a basis of 4¼c. Reinforced concrete is being resorted to in a large way by builders and a situation is created where the mills are sold out on concrete bars for quick delivery and prices are up to 3½c. and 3¾c., Pittsburgh.

**Plates.**—There has been no abatement of the heavy inquiry which has featured the market for a long period and the attitude of mills is shown by daily refusals to consider requests from domestic or export buyers, however insistent. This policy will be adhered to until orders already on their books are materially reduced, the only exception being small lots, which, for special reasons, are accepted for shipment at mills' convenience. A large Eastern independent reports the sale of two good-sized lots of ship plates to domestic yards at 10c., base, and the same company during the past week closed contracts for a considerable tonnage of tank and boiler plates at 7½c. for third quarter delivery. Official quotations are unchanged, but on such small lots as find their way to the mills' books fully ½c. a pound more is being paid. The following quotations fairly appraise the price situation as to independent companies: Tank steel, 7.159c.; ship steel, 8.659c. to 10.159c.; ordinary flange, 7.309c.; ordinary firebox, 7.359c.; Lloyd's flange, 10.159c.; Lloyd's firebox, 10.209c.; marine steel, 16.159c. to 17.159c.

**Billets.**—The market is very strong and the mills have almost nothing to sell. Usual quotations are \$75 to \$85 for open-hearth rerolling billets and \$100 to \$110 for forging billets.

**Sheets.**—Demand is very active and the minimum quotation for No. 10 blue annealed has been advanced to 6.50c., Pittsburgh. Mills are sold up and customers are forced to be content with acceptances on small lots.

**Bars.**—The Cambria Steel Company has advanced the minimum price of bars to 4c., Pittsburgh, which is the ruling quotation among independents. Mills refuse to quote beyond July 1. There is a large unsatisfied export inquiry as well as extremely active domestic demand for bar iron. During the past week J. P. Morgan & Co. were in the market for about 11,000 tons of nails, but as far as could be learned, there were no quotations.

**Coke.**—The coke market, if anything, is slightly stronger with \$8 to \$8.50 being quoted for spot furnace coke at the ovens. Under good demand, the usual inside quotation for spot foundry fuel is still \$10 to \$11 with \$9 being quoted on contracts. The car supply is unsatisfactory, with no immediate prospect of betterment.

**Iron Ore and Manganese Ore.**—One Norwegian boat is now on the way to Philadelphia with a cargo of ore. Other Norwegian owners continue to fight to withdraw from present freight contracts, the stimulus being found in the fact that these steamers which were chartered for two and three year periods at a rate of 8s. per ton could now be placed at 50s. per ton, if free to make new engagements. The Cuban situation is much improved, according to reports which tell of sufficient troops now being sent to the mines to protect workmen against the revolutionists, and regular operations are fast being resumed. The following importations of iron ore at this port during the month of April are reported by the United States Treasury Department:

	From	Quantity	Value
Iron ore.....	Cuba	5,000 tons	\$25,000
Iron ore.....	Sweden	1,022 tons	5,368
Iron ore.....	Spain	11,147 tons	50,600

**Old Material.**—Quiet but strong describes the market during the past week. Demand continues active for railroad wrought. In some quarters, stove plate and railroad malleable have been marked up 50c. and \$2 a ton, respectively, as a result of poor supply and better demand attributed to the high pig-iron levels. The usual quotations on scrap, however, remain un-

changed. Considerable metal is said to be moving toward Pittsburgh. Quotations covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 a gross ton, are about as follows:

No. 1 heavy melting steel.....	\$25.00 to \$26.00
Old steel rails, rerolling .....	34.00 to 35.00
Low-phosphorus heavy melting steel	
scrap .....	38.00 to 40.00
Old iron and steel axles (for export) ..	47.00 to 48.00
Old iron rails .....	34.00 to 35.00
Old carwheels .....	27.00 to 28.00
No. 1 railroad wrought .....	41.00 to 42.00
No. 1 forge fire .....	18.50 to 19.00
Bundled sheets .....	18.50 to 19.00
No. 2 busheling .....	16.00 to 16.50
Machine-shop turnings .....	16.00 to 16.50
Cast borings .....	16.00 to 16.50
No. 1 cast .....	28.00 to 29.00
Grate bars, railroad .....	18.00 to 19.00
Stove plate .....	18.00 to 19.00
Railroad malleable .....	23.00 to 24.00

## Cincinnati

CINCINNATI, OHIO, May 8, 1917.—(By Wire.)

**Pig Iron.**—Buying of foundry iron for shipment in the first half of next year has lately been quite heavy. It is understood that the majority of contracts placed last week for Southern iron were based on a price around \$35, Birmingham, but this week \$36 now seems to be minimum, and the latest sale to be noted at this figure is for 1000 tons to a southern Ohio melter. Other purchases previously made include 1200 tons to a nearby melter and several lots of 500 tons and over distributed through Indiana and central Ohio. Ohio silvery irons have also been active and a round tonnage was taken by a Michigan stove maker for first-half delivery and the same firm also purchased about 2000 tons of mixed Northern and Southern foundry iron. Ohio silvery iron furnaces have advanced to a minimum of \$50, furnace, for an 8 per cent analysis and a late quotation on 14 per cent Bessemer ferrosilicon is \$75, furnace. Not very much Northern foundry iron for this year's shipment is changing hands, as there is only a limited quantity in the Hanging Rock district to be disposed of. Malleable is almost unobtainable for nearby shipment. Prices on foundry, malleable and basic for shipment this year are now established at \$42, Ironton, and \$40 for movement in the first half of 1918. Lake Superior charcoal iron is in good demand and the price for No. 1 is now \$50, furnace, or \$52.55, delivered Cincinnati, for this year's shipment, but it is obtainable at from \$42.25 to \$44.75 for the first half of next year. A few lots of Virginia iron for first-half shipment next year in this territory have been sold, the largest of which is 1500 tons for a southern Ohio foundry. Virginia No. 2 X for that delivery is quoted to-day at \$38, furnace. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, for 1917 shipment, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$41.40 to \$42.40
Southern coke, No. 2 f'dry and 2 soft.....	40.90 to 41.90
Southern coke, No. 3 foundry.....	40.40 to 41.40
Southern coke, No. 4 foundry.....	39.90 to 40.90
Southern gray forge .....	31.90 to 32.40
Ohio silvery, 8 per cent silicon.....	51.26
Southern Ohio coke, No. 1.....	42.76 to 43.76
Southern Ohio coke, No. 2.....	42.26 to 43.26
Southern Ohio coke, No. 3.....	41.76 to 42.76
Southern Ohio malleable Bessemer.....	42.26 to 43.26
Basic, Northern .....	42.26 to 43.26
Lake Superior charcoal .....	52.25
Standard Southern carwheel .....	41.90

(By Mail)

**Finished Material.**—The store price of steel bars has been advanced to 4.65c. and that on twisted steel bars is 4.70c. These are the only advances that have been made within the past few days. There is a fairly good demand for reinforcing concrete bars, but most of the material now being shipped out from either the mills or from warehouse stocks was contracted for several months ago. Structural shapes are unchanged at 5c. and plates ¼ in. and heavier at 7c. The warehouse quotation on wire nails took an almost sudden jump to \$3.90 per keg, base, and barb wire is quoted from \$4.85 to \$4.90 per 100 lb. Only a limited amount of business has been booked at the advanced prices on both nails and barb wire, but the inquiry from retail merchants is very good. We quote other store prices as follows: Machine bolts, ¾ in. x 4 in. and smaller, 50 per cent discount; larger and longer, 30 and 10 per cent dis-

count; set screws, 45 per cent discount; files, 50 and 10 per cent discount, and hack saws, 10 per cent discount. The mill price of No. 28 galvanized sheets is very firm at 9.15c. and No. 28 black sheets 7.15c. No. 10 blue annealed sheets are quoted from jobbers' stocks only at 7c.

**Coke.**—Some foundry coke has been disposed of for shipment within the next 30 days, but the tonnage is very small. Prompt shipment coke has eased up to a certain extent, but as high as \$12 per net ton at oven has lately been obtained and \$10.50 has also been done for shipment in June. Contract foundry prices range from \$7.50 to \$9, although it is stated that Wise County producers are not disposed to accept anything below \$8. In the absence of any furnace coke buying, it is hard to name a correct prompt shipment quotation, but \$7 per net ton at oven is the average figure for contract business named by oven operators in the Connellsville, Wise County and Pocahontas fields.

**Old Material.**—Reports from a number of sources indicate that the market is not as firm as it should be if the present high price of pig iron is considered. It is currently reported that offerings of different kinds of scrap are running ahead of the average at this time last month. Shipments to mills in the Pittsburgh district are going forward at a satisfactory rate. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap .....	\$17.00 to \$18.00
Old iron rails .....	26.00 to 27.00
Relaying rails, 50 lb. and up.....	30.50 to 31.00
Re-rolling steel rails .....	30.00 to 30.50
Heavy melting steel rails .....	23.50 to 24.00
Steel rails for melting .....	22.50 to 23.00
Old carwheels .....	22.50 to 23.00

Per Net Ton	
No. 1 railroad wrought.....	\$25.50 to \$26.00
Cast borings .....	8.00 to 8.50
Steel turnings .....	8.00 to 8.50
Railroad cast .....	19.50 to 20.00
No. 1 machinery cast .....	20.00 to 21.00
Burnt scrap .....	11.50 to 12.00
Iron axles .....	33.50 to 34.00
Locomotive tires (smooth inside)....	34.00 to 35.00
Pipes and flues .....	14.50 to 15.00
Malleable cast .....	16.50 to 17.00
Railroad tank and sheet .....	15.00 to 15.50

## St. Louis

ST. LOUIS, Mo., May 7, 1917.

**Pig Iron.**—Transactions in pig iron decreased in the aggregate somewhat during the past week, but this was due more to the difficulty of getting the furnaces to take the orders than to a slacking up of desire on the part of buyers. Sales made for last half delivery were quite frequently closed on the condition of taking at least twice the amount for the first half of 1918 as a prerequisite. The total transactions reported reached about 10,000 tons of all grades, though No. 2 Southern foundry predominated, this being sold at \$36 to \$37, Birmingham, for first half of 1918, while last half 1917 commanded \$38 to \$40, with prompt delivery stiffly held at \$40 per ton, Birmingham. No basic iron was sold during the week. Lake Superior charcoal commanded as high as \$50 per ton, furnace, for last half delivery and some was sold at that figure. A small lot of ferromanganese was sold at \$475 per ton. No. 2 Chicago sold at \$45, furnace, while Ohio iron was entirely out of the market. The local furnace is holding at \$40, furnace, and not inclined to sell at that figure, being well sold ahead.

**Coke.**—Considerable coke was sold during the week for last half delivery, but none for 1918. Best selected 72-hr. foundry coke commanded \$8.50 for future delivery, either last half 1917 or first half 1918. Domestic coke is being actively sought and at high prices to meet an expected coal shortage.

**Finished Iron and Steel.**—Pressure for deliveries on contracts already made is severe. Light rails are higher, selling on a basis of \$60, Chicago. Some small sales of standard section rails from stock were made for special needs, but the aggregate was negligible. In the warehouses the call for material is very sharp and it is proving impossible to meet the demand even at the advanced prices. For material out of warehouse we quote as follows: Soft steel bars, 4.55c.; iron



bars, 4.50c.; structural material, 5.05c.; tank plates, 6.55c.; No. 10 blue annealed sheets, 7.05c.; No. 28 black sheets, cold rolled, one pass, 7.60c.; No. 28 galvanized sheets, black sheet gage, 10c.

**Old Material.**—The scrap market continues in a hesitant state, largely due to the conditions reported from other scrap centers, rather than from any actual developments in this territory. Mills are not buying to any extent and those dealers who are short are rather "on the fence," being a little afraid to take any definite step either way. The most interesting material in the market at present is No. 1 wrought scrap, which is very firmly held and in short supply, as none of the railroads is disposing of it. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$30.00 to \$30.50
Old steel rails, rerolling	32.00 to 32.50
Old steel rails, less than 3 ft.	30.00 to 30.50
Relaying rails, standard section, subject to inspection	36.00 to 38.00
Old carwheels	23.50 to 24.00
No. 1 railroad heavy melting steel scrap	27.00 to 27.50
Heavy shoveling steel	24.00 to 24.50
Ordinary shoveling steel	21.50 to 22.00
Frogs, switches and guards cut apart	27.00 to 27.50
Ordinary bundled sheet scrap	15.50 to 16.00
Heavy axle and tire turnings	15.00 to 15.50

Per Net Ton	
Iron angle bars	\$29.00 to \$29.50
Steel angle bars	25.00 to 25.50
Iron car axles	40.00 to 41.00
Steel car axles	38.00 to 39.00
Wrought arch bars and transoms	31.00 to 31.50
No. 1 railroad wrought	30.00 to 30.50
No. 2 railroad wrought	27.50 to 28.00
Railroad springs	26.50 to 27.00
Steel couplers and knuckles	27.50 to 28.00
Locomotive tires, 42 in. and over, smooth inside	38.00 to 39.00
No. 1 dealers' forge	24.00 to 24.50
Cast iron borings	11.50 to 12.00
No. 1 busheling	19.50 to 20.00
No. 1 boilers, cut to sheets and rings	17.00 to 17.50
No. 1 railroad cast scrap	19.50 to 20.00
Stove plate and light cast scrap	14.00 to 14.50
Railroad malleable	19.50 to 20.00
Agricultural malleable	17.50 to 18.00
Pipes and flues	17.50 to 18.00
Heavy railroad sheet and tank scrap	16.00 to 16.50
Railroad grate bars	14.00 to 14.50
Machine shop turnings	13.00 to 13.50

## Birmingham

BIRMINGHAM, ALA., May 7, 1917.

**Pig Iron.**—By May 4 the Birmingham iron market was close to a minimum of \$36, an advance of \$1 during the week, although \$35 was still the price named by some makers for 1918 delivery. At that time, the leading interest had advanced to \$36 for all deliveries. A sale of 1000 tons for 1918 at \$35 about May 1 was the opening gun of one company for that delivery. An old customer was accommodated with a fair tonnage of high silicon special iron at \$39 for second half delivery, the basis being \$37 for No. 2 foundry. Spot iron is extremely difficult to obtain, as makers are behind on delivery to regular customers on iron already ordered, and prices range from \$37 to as high as \$40. The spot market is any man's and the price depends upon all sorts of conditions. The larger concerns, however, when talking of regular business with regular customers, speak of \$35 for 1918 and \$35 and \$36 for 1917. These may be said to be the bases of big business, while the \$37 to \$40 is for such small lots of spot as may be secured in a market where it is very scarce. An idea as to car shortage is furnished by one maker, who was due to deliver 47,000 tons in April and succeeded in shipping only 21,000 to 22,000 tons. It is the same with others. The April make was up to the maximum and that of this month will establish a new high record. Inquiry is exceedingly strong. Firm offers of \$35 have been turned down. We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	\$36.50 to \$37.50
No. 2 foundry and soft	36.00 to 37.00
No. 3 foundry	35.50 to 36.50
No. 4 foundry	35.25 to 36.25
Gray forge	35.00 to 36.00
Basic	36.00 to 37.00
Charcoal	40.00 to 42.00

**Cast Iron Pipe.**—The leading worry at water pipe plants is the difficulty experienced in getting the pig iron delivered on time. Operations are almost at maxi-

mum. We quote per net ton, f.o.b. pipe shops yards, as follows: 4 in., \$53; 6 in. and upward, \$50, with \$1 added for gas pipe and special lengths.

**Coal and Coke.**—Coal is perhaps stiffer in price. Spot steam coal is around \$3.50 and blacksmithing at \$5 and \$6, the latter being very scarce at that. Contract standard beehive foundry coke is going at \$11 to \$13, f.o.b. ovens, with spot coke at \$14 and up. Furnace coke ranges from \$8 up.

**Old Material.**—The scrap market is steady at the recent advance in prices. There is a large volume of business, and supply and demand appear to be about equal. Cast scrap is being used more extensively in foundries than in a long period. We quote per gross ton, f.o.b. Birmingham district yards, as follows:

Old steel axles	\$35.00 to \$36.00
Old steel rails	20.50 to 21.50
No. 1 wrought	22.50 to 23.50
No. 1 heavy melting steel	19.00 to 20.00
No. 1 machinery cast	19.50 to 20.50
Carwheels	17.50 to 18.50
Tram carwheels	16.00 to 16.50
Stove plate and light	14.50 to 15.00
Turnings	9.25 to 9.75

**Steel Bars,** in car load lots, f.o.b. Birmingham, 3.75c. to 4.00c.; iron bars, 3.50c. to 3.70c.

## San Francisco

SAN FRANCISCO, CAL., April 24, 1917.

Notwithstanding the advancing prices of practically all steel products, and the general uncertainty incident to war time, the scarcity of materials is the chief cause for embarrassment on the Pacific coast. Building materials, such as ship and tank plates, sheets, structural steel and certain wire products, are so badly needed that price is no object. Naturally, the soaring building costs have curtailed greatly all investment building, but as there is a very fair amount of industrial work, as well as Government work, the volume of business is estimated to be above normal in the quantity of materials being consumed. There is some speculation going on, yet this is not held to be great by reason of the conservative policy of all jobbers and manufacturers in limiting business largely to the regular trade. Export inquiries continue persistent, and there is a fair tonnage going to foreign markets, at premium prices in some instances.

**Bars.**—The demand is good, but not so heavy as had been expected. Another month will see a decided increase, as the spring building season will then have gotten well under way. Coast manufacturers are quoting bars at 4c. to 4.25c. in carload lots, but in smaller quantities as high as 4.50c. to 4.75c. is charged. The jobbers' price on 3/16 and 1/2 in. bands is 6c. Quotations on other standard sizes in bars are: For 3-in. and under, 5c.; over 3-in., 6c.; twisted steel, 5c.; flats, 1/4-in. and heavier, 5c.; rounds and squares, 3/16 to 5/16 in., 6c.

**Structural Material.**—With prices stiffer than ever and material hard to get, the building situation is somewhat uncertain, yet numerous jobs of importance are under way. Angles, channels and tees under 3-in. are quoted by jobbers at 5.50c.; 3-in. to 15-in., 5.75c.; I-beams, 3 to 15 in., 5.75c. The McClintic-Marshall Company recently contracted to supply 600 tons for a new machine shop at the Mare Island Navy Yard at Vallejo. The Mortenson Construction Company has the contract for the structural steel on an addition to the Mission Theater, San Francisco. The Liberty Theater, Fresno, about to be erected, will require 150 tons. Plans are out for a bridge over the Sacramento River at Rio Vista. It will be a Strauss bascule, an exact duplicate of the bridge at Walnut Grove.

**Plates.**—Strenuous efforts are being made to hurry deliveries of ship plates to the coast, as the large number of new steel ships to be built must not be delayed any longer than absolutely necessary. Tank plates are very scarce, and Japan is taking all she can get for use in shipbuilding. Jobbers quote 8c. on 1/4-in. The Hanlon Drydock & Shipbuilding Company, Oakland, has contracts for six steel freighters totaling \$4,000,000. The plant will be enlarged and 2000 men employed. The Union Iron Works has 25 contracts for steel vessels



of large tonnage; Moore & Scott are building six steel ships ranging from 7200 to 10,000 tons. The Terminal Shipbuilding Company, with capital stock of \$1,000,000, has been incorporated; the plant is to be located at Vallejo.

**Sheets.**—Local stocks are very short. Manufacturers quote No. 10 blue annealed for third quarter at 7.35c., delivered in San Francisco. Jobbers have advanced flat galvanized to 9.46c. on Nos. 12 and 14. No. 28 is quoted at 10.34c.

**Wrought Pipe.**—Orders for tubular goods are heavy but only the regular trade can be taken care of as a rule. The war demand for oil products has further stimulated the need for oil-country goods. The big problem is that of distribution. Lap-welded sizes cannot be delivered under 15 months and butt welded sizes require from 8 to 12 weeks. The boiler tube situation is worse, no deliveries being promised except in 50 to 70 weeks. Jobbers are quoting 2-in. lap-welded boiler tubes at \$28.35 per 100 ft. There is no raise on standard sizes of pipe, either black or galvanized.

**Cast-Iron Pipe.**—The price is now \$66 per net ton on 4-in. and \$63 on 6-in. and larger, class B and heavier, with \$1 extra for class A and gas pipe. The city of Coalinga has just been supplied with 700 tons of 4, 6, 8 and 10-in. pipe for a waterworks system. The Quartermasters Department of the U. S. A. has taken 400 tons of 4, 6 and 8 in. pipe for Government work.

**Pig Iron.**—What buying there is shows reluctance at the high prices. Stocks at local foundries and mills are still holding out, but a shortage is expected soon. No concern has as much as a year's supply ahead now, it is claimed. No. 2 foundry costs delivered about \$48, in small lots, and is hard to get. On April 19 the price of \$53.84, f.o.b. San Francisco, was quoted by manufacturers on No. 1, high-grade manganese iron, for last-half delivery.

**Coke.**—Spot stocks command \$28. Some foundries have fair stocks on hand.

**Ferroalloys.**—Ferromanganese and ferrosilicon are both selling here at about \$350. The American Manganese Mining & Smelting Company is preparing to work its claims near Ono, Cal. The ore will be shipped to the smelter at Heroult, 18 miles distant, and a new road has been built for this purpose.

**Old Material.**—The demand is steady locally, with many outside inquiries. Small quantities of selected scrap are being shipped at high rates to Japan. Mixed steel scrap is being sold at from \$17 to \$22. Wrought scrap holds very firm at \$20; light cast finds purchasers at \$15, and heavy machinery scrap is selling as high as \$25 for export.

## New York

NEW YORK, May 9, 1917.

**Pig Iron.**—The foundry iron market is rather quieter than last week's. Inquiries continue to come up and lots of 500 to 700 tons are under consideration, including one of 500 tons for the New York Central. A New Jersey foundry that has been in the market in the past two weeks has bought 3000 to 5000 tons for delivery in the last half of this year. An agricultural works in the Hudson Valley is in the market for 2000 tons for next year. Eastern Pennsylvania furnaces are asking from \$42 to \$44 at furnace for No. 2 X foundry iron. Buffalo prices vary. One interest in the district which makes an iron that has not been as active as others for the past two years, has made sales at \$41.50 to \$42 at furnace, whereas other producers in that district with very little iron to offer for this year are still naming \$45. In eastern Pennsylvania a steel company is in the market for low phosphorus basic, but there has not been much activity in basic in that territory of late. A New Jersey interest that has recently started on the production of pig iron has made sales of foundry iron in eastern Pennsylvania. We quote at tidewater for early delivery as follows:

No. 1 foundry .....	\$43.50 to \$44.50
No. 2 X .....	42.50 to 43.50
No. 2 plain .....	42.00 to 42.50
Southern No. 1 foundry.....	43.00 to 44.00
Southern No. 2 foundry and soft....	41.00 to 42.00

**Ferroalloys.**—Spiegeleisen has sold at unusually high prices in the past week, in line with the recent advance in ferromanganese. A large portion of that which has been before the market recently was sold for delivery over the last half at a price above \$75 per ton, furnace, and a small lot went for early delivery at something above \$85, furnace. These are probably the highest prices at which spiegeleisen has ever sold. There are also several inquiries in the market, one amounting to 3000 tons, and the situation is very strong. The quotation may be regarded as \$75 to \$85, furnace, for any delivery this year. Ferromanganese continues very strong, the quotation for the domestic product ranging from \$400 to \$500 for any delivery, depending on conditions. One dealer quotes \$350 for the domestic on contract. A lot of resale British alloy was sold recently for \$400 and a quantity of electrolytic alloy produced by an Alabama maker went for \$425, both for early delivery. There is no definite news as to the attitude nor the supply of British producers, but it is believed that strong efforts are being made on this side to bring about a better understanding and a freer delivery from that source. Ferrosilicon, 50 per cent, is still strong and active, with the Government inquiring for 2400 tons, f.o.b. works, of alloy running 80 to 85 per cent silicon and also for 16,000 lb. of the regular grade for delivery at Puget Sound. The alloy is selling anywhere at \$200 to \$250, depending on circumstances.

**Structural Material.**—While the market is not active, so far as large projects are concerned, the number of smaller ones that are appearing and resulting in contracts is fairly large. The Government is again definitely appearing, and yesterday opened bids for about 2000 tons for hangars at the Aviation Field at Pensacola, Fla., on which H. Monk, a local fabricator, is the low bidder, and for 200 tons for a magazine and shell building at Fort Mifflin, on which McClusky & Bahls, Philadelphia, are low bidders. It is reported that the Government will ultimately purchase 5000 hangars, each one requiring about 30 tons. The American Bridge Company has taken 250 tons for a bridge for the Pennsylvania Railroad, 130 tons for a highway bridge for the Boston & Maine, and has been definitely awarded the contract for 800 tons for 10 bridges for the Pennsylvania Railroad, while the Phoenix Iron Company will furnish 2300 tons for the new public library in Philadelphia. The gun shop for the Bethlehem Steel Company will require about 3000 tons, which the company will furnish itself. It is reported that the Ferguson Iron & Steel Company has taken 500 tons for the Isco Chemical Company, Niagara Falls, and that Milliken Brothers, Inc., will furnish the 1100 tons for the Stanley theater, at Philadelphia. Among new inquiries recently appearing are the following: 3200 tons for a machine shop and 2000 tons for a foundry at the Norfolk Navy Yard, as well as 250 tons for a naval storage shed at New Orleans, 1000 tons for the Penn-Harris Hotel at Harrisburg, 550 tons for the Central Railroad of New Jersey; 800 tons for a viaduct for the Norfolk & Western, 450 tons for seven bridges for the New York Central, and on 200 tons for two bridges for the Pennsylvania Railroad. Besides these the Philadelphia & Reading is asking for 250 tons for one bridge and the Erie for about 300 tons for several bridges. The Revere Sugar Refining Company, Boston, will require 1000 tons for a wharf shed. There has been no decision on the 1100 tons required for double tracking the viaducts in West Virginia for the Virginian. The inquiries for 300 tons covering several buildings reported last week have not yet resulted in contracts and it would not be a surprise if they were abandoned. We now quote plain material from mill at 4.419c. to 4.919c., New York, the lower price in three to four months and the higher for small lots in earlier deliveries. For future shipments, 4.169c. seems to be the minimum. Shipments from warehouses are \$5 per ton higher, or 5c. per lb., New York.

**Steel Plates.**—A contract with a domestic user of tank plates for a total of 10,000 tons has been closed at 7.50c., Pittsburgh. A wide range in prices still exists. A few hundred tons, representing the resale of a concern having no further use for the material,

have been offered at 6c., but the lot is not regarded generally attractive except possibly to a jobber. No notable sales of hull plates have been reported, but offers to the mills of 9c. per lb. have been turned down, as has an offer of 6000 tons at 10c. Prices out of warehouse have been advanced \$10 per ton, and we now quote plates out of store at 7.50c., New York. We quote mill shipments of universal and tank plates at 6.669c. to 7.669c., New York, with little available before the last quarter, and ship plates at 8.169c. and higher, New York, the price depending on the outcome of each individual bargaining.

**Steel Bars.**—No special activity is noted, the trade displaying a waiting attitude to ascertain the outcome of Government activity and the effect and conditions of purchasing from that source. In billets an inquiry of 50,000 tons has been made, said to be for the Government, though the character of the rolled product was not made clear. In wire nails an inquiry for the Allies of no less than 12,000 tons is noted. Spikes have been advanced, the larger sizes \$3 per ton and the smaller sizes \$5 per ton. Warehouse prices are also higher, \$5 per ton in the case of steel bars and \$6 per ton in the case of iron bars. We quote steel bars at 3.919c. to 4.669c., New York, with almost an absence of any sizeable purchases, and iron bars at 4.169c., New York. From New York district warehouses we quote iron bars at 4.60c. and steel bars at 4.75c.

**Cast Iron Pipe.**—The War Department has asked for prices and best deliveries on 1000 tons of 16-in. pipe, presumably for camp purposes. No sizeable municipal lettings are reported, but the general high degree of activity of recent weeks is maintained with a strong price tendency. Carload lots of 6-in., class B and heavier, are now quoted at \$55.50 per net ton, tidewater, with class A and gas pipe taking an extra of \$1 per ton.

**Old Material.**—Heavy melting steel is in no particular demand, but some dealers appear to be accumulating. Most of the movement to consumers is still to the Pittsburgh district, and to Buffalo, and the higher prices obtainable in these markets tend to maintain a measurable differential between quotations in eastern Pennsylvania and these other consuming centers. In a considerable number of items of the list noted below, the sales have been so scattered and infrequent as to make it difficult to establish quotations at the moment. As regards heavy melting steel, it is pointed out that scrap in Buffalo is worth \$28 to \$29 per gross ton, so that allowing for the freight charge of nearly \$3, the New York price would be close to \$25 on a sale. No. 1 railroad wrought has brought \$43 per gross ton in eastern Pennsylvania. Brokers quote buying prices as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for shipment to eastern Pennsylvania).....	\$22.00 to \$22.50
Old steel rails (short lengths) or equivalent heavy steel scrap.....	24.50 to 25.00
Relaying rails (nominal).....	42.00 to 43.00
Rerolling rails.....	35.00 to 35.50
Iron and steel car axles.....	46.00 to 47.50
No. 1 railroad wrought.....	39.00 to 40.00
Wrought-iron track scrap.....	33.00 to 34.00
No. 1 yard wrought, long.....	33.00 to 33.50
Light iron.....	7.50 to 8.00
Cast borings (clean).....	13.50 to 14.00
Machine-shop turnings.....	12.50 to 13.00
Mixed borings and turnings.....	11.50 to 12.00
Wrought-iron pipe (not galvanized or enameled).....	19.50 to 20.00

A sale in New England of 2000 tons of No. 1 machinery cast scrap, averaging \$32.50 is noted. Such scrap is scarce and the general list is stronger. Dealers in New York City and Brooklyn are quoting as follows to local foundries, per gross ton:

No. 1 machinery cast.....	\$26.50 to \$27.00
No. 1 heavy cast (column, building material, etc.).....	25.00 to 25.50
No. 2 cast (radiators, cast boilers, etc.).....	21.50 to 22.00
Stove plate.....	17.00 to 17.50
Locomotive grate bars.....	16.50 to 17.00
Old carwheels.....	27.00 to 28.00
Malleable cast (railroad).....	24.00 to 24.50

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until May 15, Schedule 1052, for 400 tons of foundry pig iron for Washington.

## Cleveland

CLEVELAND, OHIO, May 8, 1917.

**Iron Ore.**—An ore shortage has developed as a result of the delay in getting the movement under way from Lake Superior ports. Some consumers have about reached the bottom of their stockpiles and are making efforts to secure shipments at the earliest possible moment. Ice conditions have improved and some vessels succeeded in reaching Duluth yesterday and others broke through Whitefish Bay, where a large fleet has been held in the ice several days. Nearly all the ore shipments so far this season have been made from Escanaba. The movement from that port is now about normal, but few cargoes have got away from Duluth. April shipments were 211,532 gross tons, as compared with 1,658,411 tons during the same month last year. The ore movement has been set back about 3,000,000 tons so far this season because of the late opening of navigation, and vessel men estimate that by the time conditions on the Lakes are normal and boats are running on their regular schedules shipments will be about 5,000,000 tons behind last year. Shippers will find it very difficult to speed up the movement to regain this loss. Ore on Lake Erie docks May 1 exceeded the amount on the docks a year ago by approximately 1,460,000 gross tons. The dock balance May 1 was 4,772,232 tons, as compared with 3,311,399 tons a year ago. April dock shipments were 2,020,903 tons, as compared with 1,979,247 tons a year ago. The market is inactive. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer, \$5.20; Mesaba non-Bessemer, \$5.05.

**Pig Iron.**—There is an increased demand for steel-making iron, but inquiry for foundry iron is less active than it has been, particularly in this immediate territory. The United Steel Alloys Corporation, Canton, Ohio, came into the market a few days ago for 35,000 to 40,000 tons of basic iron for shipment during the last quarter and first quarter and has secured the greater part of the desired tonnage. It is understood that this iron was purchased at \$40, but it is doubtful if any more can be had at that price. The Central Steel Company, Massillon, has an inquiry out for a round tonnage of basic for fourth quarter delivery. Several other inquiries, both for basic and Bessemer iron for the last half are pending, these ranging from 5000 to 20,000 tons. One Cleveland interest is quoting basic at \$42 and Bessemer at \$44. An inquiry is pending from the Pittsburgh district of 1200 tons of low phosphorus iron for the last half. The foundry iron market is very firm and one Cleveland interest has advanced its Valley price to \$43 for No. 2 for this year and has made sales for prompt shipment and the last half at that price. Other furnaces are quoting foundry iron at \$42 for this year's delivery and \$40 for the first half of next year. The demand for malleable iron continues quite active. The price of Southern iron for the first half of next year's delivery has been advanced \$1 a ton in this territory to \$36, some sales being made at that price, and \$38 to \$40 is being quoted for this year's delivery. One producer was offered \$40 for spot iron, but was unable to take the business. The car situation has again become bad and some furnaces are unable to ship the iron as fast as they are making it. The consumers are crowding the furnaces for shipments, many desiring to accumulate good stocks of iron to protect them against possible delays in deliveries later. Difficulties are being experienced in getting iron into Canada, owing to the refusal of American railroads to allow their rolling stock to leave the country, and in some cases iron is being transferred to Canadian cars at border points. We quote, delivered Cleveland, as follows:

Bessemer.....	\$42.95 to \$44.95
Basic.....	41.80 to 42.30
Northern No. 2 foundry.....	40.30 to 42.30
Southern No. 2 foundry.....	40.00 to 42.00
Gray forge.....	39.95
Ohio silvery, 8 per cent silicon.....	51.62 to 52.62
Standard low phos., valley furnace.....	70.00 to 75.00

**Coke.**—There is a heavy demand for foundry coke on contracts owing to the desire of consumers to accumulate large stocks to protect them against delayed deliv-



eries later. Some of the producers are now making their contracts subject to cancellation should the Government require either their coal or coke. New buying is quiet. We quote standard Connelsville foundry coke at \$8 to \$8.50 per net ton at oven for contracts, and \$9.50 for prompt shipment. Furnace coke is quoted at \$7.25 to \$7.50 for prompt shipment.

**Bolts, Nuts and Rivets.**—The demand for bolts and nuts on contracts is heavy, and there is a good volume of business coming out in current orders. Rivet specifications are heavy, but not a great deal of new business is reported, as most consumers are under contract. We quote rivets at 4.75c., Pittsburgh, for structural and 4.85c. for boiler rivets for delivery before July 1. For third quarter contracts prices are \$3 a ton higher. Bolt and nut discounts are as follows:

Common carriage bolts,  $\frac{3}{4}$  x 6 in., smaller or shorter, rolled thread, 40 off; cut thread, 35 and 2½; larger or longer, 25. Machine bolts, with h. p. nuts,  $\frac{3}{4}$  x 4 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40; larger and longer, 30. Lag bolts, cone point, 45. Square h. p. nuts, blank, \$2.10 off list; tapped, \$1.90 off list. Hexagon h. p. nuts, blank, \$1.90 off; tapped, \$1.70 off. C. p. c. and t. hexagon nuts, all sizes, blank, \$1.60 off; tapped, \$1.40 off. Cold pressed semi-finished hexagon nuts, 50 and 10 off.

**Old Material.**—The market is dull, but prices are being well maintained. Cleveland mills have large supplies of scrap in their yards or under contract and are not buying any additional material. About the only activity is in cast scrap, which is in good demand from Cleveland foundries, one coming in the market late in the week for 1000 tons of cast scrap. Sales are reported at \$22, but the market is somewhat firmer and as high as \$23 is being asked for this grade. Busheling is inactive and lower. There is some trading between dealers in borings and turnings. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$26.50 to \$27.00
Steel rails, rerolling	36.00 to 37.00
Steel rails under 3 ft.	31.00 to 32.00
Iron rails	33.00 to 34.00
Steel car axles	45.00 to 47.00
Heavy melting steel	27.50 to 28.00
Carwheels	23.50 to 24.00
Relaying rails, 50 lb. and over	37.00 to 38.00
Agricultural malleable	18.50 to 19.00
Railroad malleable	24.00 to 25.00
Light bundled sheet scrap	17.75 to 18.50

Per Net Ton	
Iron car axles	\$46.00 to \$47.00
Cast borings	11.75 to 12.25
Iron and steel turnings and drillings	11.00 to 11.25
No. 1 busheling	20.50 to 21.00
No. 1 railroad wrought	32.00 to 32.50
No. 1 cast	22.00 to 23.00
Railroad grate bars	16.50 to 17.00
Stove plate	16.00 to 16.50

**Finished Iron and Steel.**—New inquiries are coming out in good volume for about all finished lines, and specifications are fairly heavy. Mills are making special efforts to supply the demands of the implement manufacturers in order to prevent a shortage in new agricultural implements required to harvest this year's crops. The demand for plates continues very heavy and a Cleveland mill has advanced its minimum price to 8c. and reports the sale of a good sized lot at a higher price. On an inquiry for 2000 tons of Class A plates and 500 tons of structural material one Eastern mill quoted 10c. for the former and 6c. for the latter. The same interest has advanced its price for steel bars to 4c. In structural work the Fort Pitt Bridge Company has taken 2700 tons for a power house for the Firestone Tire & Rubber Company, Akron. Some industrial building work that has been planned recently is being held up because of uncertainty as to future conditions on account of the war. Rerolling mills making hard steel bars are meeting with competition from a Cleveland mill that is offering bars rerolled from shell discard at about 3c. as compared with the quotation of 3.25c. at mill made by the rerolling mills. Bar iron is firm at 3.50c., Cleveland. The demand for black and blue annealed sheets continues very heavy, most inquiries coming from consumers that are anxious to place orders accompanied by specifications for such deliveries as mills are able to make. We quote sheets at 6.75c. to 7.25c. for No. 28 black; 6.75c. to 7c. for No. 10 blue annealed, and 8.50c. to 9.25c. for No. 28 galvanized. Cleveland warehouse sales are being made

at 7.50c. for black and 10c. for galvanized. A movement is under way to make the National Association of Sheet and Tin Plate Manufacturers a clearing house for all Government sheet orders. Warehouse prices are unchanged at 4.50c. for steel bars; 5c. for structural material; 7c. for plates, and 7c. for blue annealed sheets.

## Buffalo

BUFFALO, N. Y., May 8, 1917.

**Pig Iron.**—Prices continue to grow stiffer; the range now being \$45 to \$47 for 1917 delivery. Such furnace interests as are selling for 1918 delivery are making the usual lower scale differential for far forward deliveries; but are not inclined to take on such business except for established customers and are becoming more conservative about commitments for delivery for that period. On the other hand, users are also conservative in regard to 1918 buying, and are not inclined to purchase except where they have known requirements, covering production ordered for next year. A large proportion of the trade of the district has not yet come before the market for 1918 requirements. We quote as follows for 1917 delivery, f.o.b. furnace, Buffalo:

High silicon irons	\$47.00
No. 1 foundry	46.00
No. 2 X foundry	45.50
No. 2 plain	45.00
No. 3 foundry	45.00
Gray forge	45.00
Malleable	45.50
Basic	45.00 to 45.50
Charcoal (nominal)	50.00 to 51.00

**Finished Iron and Steel.**—Extensive demand for plates continues; particularly for ship building requirements; and the prices prevailing are from 8½c. to 10c. per lb. The demand for structural material for ship building purposes is also of good proportions; but easier to supply than is the case with plates. Warehouse prices advanced May 4 to 5.10c. for structural shapes, 7.10c. for plates, of such sizes as are in stock; bars and small shapes remaining at 4.55c. The Ferguson Steel & Iron Company, Buffalo, have received the contract for the steel for a new foundry building at the East Buffalo plant of Farrar & Trefts, Inc., 400 tons, and the Buffalo Structural Steel Company has the contract for steel for the new foundry addition of the American Radiator Company, Buffalo, 100 tons.

**Old Material.**—In addition to the embargoes reported last week, shipments on contracts are being freely rejected at some of the Pittsburgh delivery points. No new sales of any considerable size in heavy melting steel have been made during the week. Local consumers apparently have covered their requirements for this commodity and are out of the market for the time being. There has been some business done in other lines, however, and prices are firmly held, with some increases, as reported below. Both dealers and consumers are endeavoring to "play safe," dealings covering only absolute requirements. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$27.50 to \$28.00
Low phosphorus	36.00 to 38.00
No. 1 railroad wrought	37.00 to 38.00
No. 1 railroad and machinery cast	28.00 to 28.50
Iron axles	45.00
Steel axles	45.00
Carwheels	26.50 to 27.50
Railroad malleable	26.00 to 26.50
Machine shop turnings	13.00 to 13.50
Heavy axle turnings	19.50 to 20.00
Clean cast borings	12.00 to 13.50
Iron rails	29.50 to 30.00
Locomotive grate bars	17.50 to 18.00
Stove plate	18.00 to 18.50
Wrought pipe	17.00 to 17.50
No. 1 busheling scrap	23.00 to 23.50
No. 2 busheling scrap	14.00 to 14.50
Bundled sheet scrap	16.50 to 17.00

The Trussville Iron Company, Birmingham, Ala., has been incorporated with nominal capital stock of \$2,000. W. C. Cocke is president; Fred Fite, vice-president; D. E. Love, secretary and treasurer, and D. Swann, assistant secretary. They will repair and operate the idle furnace at Trussville, Ala., recently purchased by E. A. Shedd and associates, of Chicago, from the Michigan Trust Company, Grand Rapids.



## British Steel Market

### American Steel Hardly Obtainable—Pig Iron Firm—Tin Plate Higher

LONDON, ENGLAND, May 9, 1917.—(By Cable)

The pig-iron market is firm, with larger allocations of Cleveland iron. Tin plates are quoted at 29s. 6d., with sellers lacking. Ferromanganese is nominal and American semi-finished steel is practically unobtainable. There is a keen demand for finished steel, but offerings are scarce. Ship plates are nominal and wire nails have sold, c.i.f. France at 38s. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 29s. 6d. against 28s. 9d. last week.

Ferromanganese, £40 nominal.

Ferrosilicon, 50 per cent, c.i.f., £35 upward.

### Steel Companies Subscribe to Liberty Loan

PITTSBURGH, PA., May 9. (By wire.)—The Youngstown Sheet & Tube Co., Youngstown, Ohio, has subscribed \$3,000,000 to the Government Liberty Loan. The company has also declared a regular quarterly dividend of 1% per cent on the preferred stock and 2 per cent on the common, and 3 per cent extra on the common, all dividends payable July 1.

The Jones & Laughlin Steel Company of Pittsburgh has subscribed \$1,000,000 to the Liberty Loan through the Union Trust Company of Pittsburgh.

### Free Movement of Scrap Threatened

Dealers in old material express apprehension over the possibility that the movement of scrap may be hampered by Emergency Rule 1 of the Railway Committee on National Defense governing the use of gondola and hopper cars. This rule, framed to give preference to coal and iron ore traffic, specifies that every movement of such cars when made empty must thereafter be in the direction of the home road whether loaded again or empty. Gondolas are preferred for the transportation of scrap, for the reason that they can be loaded and unloaded with magnets, an impossibility with box cars. The attention of the Interstate Commerce Commission has been directed to the matter.

### Ore Advance Not Allowed

WASHINGTON, May 8, 1917.—In reply to many inquiries received here officials of the Interstate Commerce Commission state that reports recently appearing in the daily press to the effect that the projected advance of 15c. per ton on iron ore has been allowed are altogether without foundation. There is, in fact, less probability that this advance will be approved than at any time since the tariffs in which it was incorporated were filed.

The Minnequa steel works of the Colorado Fuel & Iron Company, according to the company's *Bulletin* of April 30, broke all records in total shipments and in production of the open-hearth department and the rail mill in March. Figures are not given, but it is added that the percentage of injuries was the lowest for the 18 months in which injury records have been kept on the present system.

The Donner Steel Company has men at work engaged in relining stack B of its Tonawanda Steel & Iron Co. blast furnace plant at North Tonawanda and the work is being rushed. Ore is being received by rail, and it is expected the stack will go into commission this month.

At the annual meeting of the Newark Foundrymen's Association, held May 2, the following officers were elected: Arthur E. Barlow, president; George Krouse, vice-president; John Campbell, treasurer, and Ulrich Eberhardt, secretary. It was decided to hold meetings during the ensuing year quarterly instead of monthly.

## Iron and Industrial Stocks

NEW YORK, May 9, 1917.

The sagging of the stock market last week reflected the patriotism of the people, for it was evident that many were selling securities in order to subscribe to the Liberty Loan of \$2,000,000,000. Bethlehem Steel lost 4% points last week, American Locomotive, 2%; Baldwin Locomotive, 3%; Republic Iron & Steel, 3%, and United States Steel, 2%. Although this loan is the greatest undertaking ever inaugurated by the Treasury Department and is likely to continue to have a depressing effect on the stock market quotations, the resources of the nation are so tremendous that the strain is not likely to be serious. The range of prices on iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.. 24 - 26	Int. Har. of N. J., pref. .... 115 - 118
Allis-Chal., pref.. 80% - 83 1/2	Int. Har. Corp., com. .... 76 - 77
Am. British, com. .... 10	Lacka. Steel.... 81% - 84 1/2
Am. Can, com... 41 - 46 1/2	Lake Sup. Corp. 17 1/2 - 19 1/2
Am. Can, pref.. 103 - 105	Lima Loco. .... 53
Am. Car & Fdry., com. .... 64 - 67 1/2	Lukens, com. .... 35
Am. Car & Fdry., pref. .... 116	Lukens, 1st pref. 100 1/4 - 101
Am. Loco., com. .... 65 - 68 1/2	Midvale Steel ... 55 1/2 - 58 1/2
Am. Loco., pref.. 102 - 102 1/2	Nat.-Acme .... 32 1/2 - 33 1/2
Am. Rad., com. .... 28 1/2	Nat. En. & Stm., com. .... 29% - 31%
Am. Ship, com... 71 - 76	N. Y. Air Brake. 134 - 136
Am. Steel Fdries. 58 - 60	Pitts. Steel, pref. 99 1/2 - 100 1/2
Bald. Loco., com. 51 1/4 - 57	Pressed Stl., com. 73 - 75
Bald. Loco., pref. 99 - 100 1/2	Ry. Steel Spring, com. .... 46 1/2 - 48
Beth. Steel, class B .... 117 1/2 - 124 1/2	Ry. Steel Spring, pref. .... 95 1/2 - 97 1/2
Beth. Steel, pref. .... 120	Republic, com. ... 77 1/2 - 80 1/2
Cambria Steel... 113 - 115	Republic, pref. ... 101 - 102 1/2
Cent. Fdry., com. 21 1/2 - 22 1/2	Sloss, com. .... 45 1/2 - 48 1/2
Cent. Fdry., pref. 42 - 43 1/2	Superior Steel... 33 1/2 - 34 1/2
Charcoal Iron, com. .... 7 1/4 - 7 1/2	Superior Steel, 1st pref. .... 99 1/2
Chic. Pneu. Tool. 68 - 70	Transue-Williams 42 - 42 1/2
Colo. Fuel .... 45 1/2 - 46 1/2	Un. Alloy Steel.. 40% - 43
Cruc. Steel, com. 59% - 63 1/2	U. S. Pipe, com. ... 18 1/4 - 19%
Cruc. Steel, pref. 107 - 109	U. S. Pipe, pref. ... 55
Deere & Co., pref. 99 - 99 1/2	U. S. Steel, com. 113 - 116%
Driggs-Seabury .. 75 - 76 1/2	U. S. Steel, pref. 117 1/2 - 118 1/2
Gen. Electric... 155 - 163 1/2	U. S. Steel, pref. 117 1/2 - 118 1/2
Gt. No. Ore Cert. 30 - 33 1/4	Va. I. C. & Coke 62 - 70
Gulf States Steel. 117 - 123	Warwick .... 9
Int. Har. of N. J., com. .... 111 - 114 1/2	Westing. Elec.... 47 - 48 1/2

### Dividends

The American Radiator Company, quarterly, 3 per cent on the common, payable June 30, and 1% per cent on the preferred, payable May 15.

The Atlantic Steel Company, 3 1/2% per cent on the preferred, payable May 1.

The Bethlehem Steel Company, quarterly, 2 1/2% per cent on the common, and 2 1/2% per cent on class B, both payable July 2.

Deere & Co., regular quarterly, 1 1/4% per cent on the preferred, payable June 1.

The General Fireproofing Company, regular quarterly, 1% per cent on both the common and preferred, payable July 1.

The International Harvester Company of New Jersey, regular quarterly, 1 1/4% per cent on the preferred, payable June 1.

The International Harvester Corporation, regular quarterly, 1 1/4% per cent on the preferred, payable June 1.

The Pittsburgh Steel Company, regular quarterly, 1% per cent on the preferred, payable June 1.

The Studebaker Corporation, quarterly, 2 1/2% per cent on the common and 1 1/4% per cent on the preferred, both payable June 1.

The Trussed Concrete Steel Company, quarterly, 1% per cent on the preferred, payable June 1.

### New Low-Phosphorus Pig-Iron Producer

The Crab Orchard Iron & Steel Company, a new organization, has taken over the Magnetic Coal & Iron Company, Chicago, which owned low-phosphorus ore deposits in Carter County, Tenn. The new company has acquired a blast furnace at Bristol, Tenn., and it is expected that about Aug. 1 it will be producing low-phosphorus pig iron.

The Driggs-Seabury Ordnance Corporation has awarded contract to Westinghouse, Church, Kerr & Co., Inc., of New York, for extensive improvements to its plant at Sharon, Pa., including additions to the pressed steel department, forge shop and machine shops, and the construction of a die shop and a crane-way in the yard for handling billets and other materials. A new office building will be erected in order to provide room for the plant expansion.

## Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

**Structural Material.**—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees 3 in. and over, 4c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than 1/4 in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

**Plates.**—Tank plates, 1/4 in. thick, 6 in. up to 100 in. wide, 5.50c. to 6c., base, net cash, 30 days, or 1/2 of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras	
Rectangular, 1/4 in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than 1/4 in., including 3/16 in., up to 72 in. wide.	.10
*Lighter than 1/4 in., including 3/16 in., over 72 in. to 84 in.	.20
*Lighter than 1/4 in., including 3/16 in., over 84 in. to 96 in.	.30
*Lighter than 1/4 in., including 3/16 in., over 96 in. to 100 in.	.40
*Lighter than 1/4 in., including 3/16 in., over 100 in. to 102 in.	.45
*Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84 in.	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96 in.	.35
*Lighter than No. 8, including No. 10, up to 60 in. wide.	.30
*Lighter than No. 8, including No. 10, over 60 in. to 64 in.	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered 1/4 in.	
Over 72 in. must be ordered 1/4 in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras	
Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras	
Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras	
No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft., to 2 ft., inclusive	.55
Circles under 2 ft., to 1 ft., inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

\*Including extra for width.

**Wire Rods.**—Including chain rods, \$85 to \$90.

**Wire Products.**—Prices to jobbers, effective April 20: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$3.45; galvanized, \$4.15. Galvanized barb wire and

staples, \$4.35; painted, \$3.65. Wire nails, \$3.50. Galvanized nails, 1 in. and longer, \$2.20 advance over base price; shorter than 1 in., \$2.70 advance over base price. Cement coated nails, \$3.40. Woven wire fencing, 48 per cent off list for carloads, 47 off for 1000-rod lots, 46 off for less than 1000-rod lots.

**Wrought Pipe.**—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from May 1, 1917, all full weight:

Steel		Butt Weld		Iron	
Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8	42	15 1/2	1/8 and 3/8	30	3
1/2	46	31 1/2	3/8	31	4
3/4 to 3	49	35 1/2	1/2	35	17
			3/4 to 1 1/2	38	22
Lap Weld					
2	42	28 1/2	1 1/4	23	8
2 1/2 to 6	45	32 1/2	1 1/2	30	16
7 to 12	42	28 1/2	2	31	17
13 and 14	32 1/2		2 1/2 to 4	33	20
15	30		4 1/2 to 6	33	20
			7 to 12	32	19
Butt Weld, extra strong, plain ends					
1/8, 1/4 and 3/8	38	20 1/2	1/8, 1/4 and 3/8	29	12
1/2	43	30 1/2	3/8	34	21
3/4 to 1 1/2	47	34 1/2	1/2	38	23
2 to 3	48	35 1/2	3/4 to 1 1/2		
Lap Weld, extra strong, plain ends					
2	40	28 1/2	1 1/4	24	9
2 1/2 to 4	43	31 1/2	1 1/2	30	16
4 1/2 to 6	42	30 1/2	2	32	19
7 to 8	38	24 1/2	2 1/2 to 4	34	22
9 to 12	33	19 1/2	4 1/2 to 6	33	21
			7 to 8	27	15
			9 to 12	22	10

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

**Boiler Tubes.**—Nominal discounts on less than carloads, freight added to point of delivery, effective from Nov. 1, 1916, on standard charcoal iron tubes, and from April 2, 1917, on lap welded steel tubes are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1 1/4 and 2 in.	.31	1 1/2 in.	.23
2 1/4 in.	.28	1 3/4 and 2 in.	.35
2 1/2 and 2 3/4 in.	.34	2 1/4 in.	.32
3 and 3 1/4 in.	.34	2 1/2 and 2 3/4 in.	.28
3 1/2 to 4 1/2 in.	.34	3 and 3 1/4 in.	.43
5 and 6 in.	.33	3 1/2 to 4 1/2 in. No quotations	
7 to 13 in.	.30	5 and 6 in.	.37
		7 to 13 in.	.34

Above discounts apply to standard gages and to even gages not more than four gages heavier than standard in standard lengths.

Locomotive and steamship special charcoal grades bring higher prices.

1 1/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

**Sheets.**—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days.

[Open-hearth stock, \$5 per ton above these prices.]

Blue Annealed—Bessemer	Cents per lb.
Nos. 3 to 8	5.50 to 5.75
Nos. 9 and 10	5.55 to 5.80
Nos. 11 and 12	5.65 to 5.85
Nos. 13 and 14	5.60 to 6.90
Nos. 15 and 16	5.65 to 7.00

Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	6.30 to 6.80
Nos. 22 and 24	6.35 to 6.70
Nos. 25 and 26	6.40 to 6.90
No. 27	6.45 to 6.95
No. 28	6.50 to 7.00
No. 29	6.55 to 7.05
No. 30	6.65 to 7.15

Galvanized Black Sheet Gage—Bessemer	
Nos. 10 and 11	7.00 to 7.50
Nos. 12 and 14	7.10 to 7.60
Nos. 15 and 16	7.35 to 7.85
Nos. 17 to 21	7.40 to 7.90
Nos. 22 and 24	7.55 to 8.05
Nos. 25 and 26	7.70 to 8.20
No. 27	7.75 to 8.25
No. 28	8.00 to 8.50
No. 29	8.15 to 8.65
No. 30	8.30 to 8.80

Tin-Mill Black Plate—Bessemer	
Nos. 15 and 16	6.30 to 6.55
Nos. 17 to 21	6.35 to 6.60
Nos. 22 to 24	6.40 to 6.65
Nos. 25 to 27	6.45 to 6.70
No. 28	6.50 to 6.75
No. 29	6.55 to 6.80
No. 30	6.65 to 6.85
Nos. 30 1/2 and 31	6.60 to 6.85

## Metal Markets

### The Week's Prices

Cents Per Pound for Early Delivery									
Copper, New York		Tin, New York		Lead, New York		Spelter, New York		St. Louis	
May	Lake	Electrolytic	York	York	St. Louis	York	St. Louis	York	St. Louis
2.....	31.00	31.00	58.25	9.87½	9.75	9.50	9.25	9.25	9.25
3.....	31.00	31.00	58.25	9.87½	9.75	9.50	9.25	9.25	9.25
4.....	31.00	31.00	58.50	9.87½	9.75	9.50	9.25	9.25	9.25
5.....	31.00	31.00	.....	10.00	9.85	9.37½	9.12½	9.12½	9.12½
7.....	31.00	31.00	59.00	10.25	10.12½	9.37½	9.12½	9.12½	9.12½
8.....	31.00	31.00	59.37½	10.45	10.25	9.37½	9.12½	9.12½	9.12½

NEW YORK, May 9, 1917.

The metals are generally stronger as indications of the Government's policy appear clearer. Copper is more active and firmer. Tin is advancing and is very strong. Lead grows scarcer and the market stronger as it advances. Spelter is quiet but steady. Antimony has declined rapidly.

### New York

**Copper.**—Good sales in the past week have contributed strength to the market and without doubt considerable business has been done for delivery in the third quarter at about 29c., New York. There have also been sales at 31c. for June. The conviction seems to be growing that no more metal will be sold at the low price accorded the Government some weeks ago and many believe that the needs of the belligerents as a whole will be supplied at from 25c. to 27c. per lb., New York. It is believed that the recent sales have been confined to a few large consumers. The quotation for the third quarter is about 29c., New York, with nearby delivery at 31c. for both Lake and electrolytic. The London quotation for spot electrolytic is unchanged from last week at £142.

**Tin.**—Early this week the best demand and sales for a long time appeared and sales totaled probably 400 tons, taken principally by a few sellers. The dominating influence in the market is the question of ships to bring tin to this country, as it is generally conceded that mutual arrangements between this country and Great Britain will be satisfactory so far as licenses to ship are concerned. The market has advanced each day in the past week until very little spot metal is available with most sellers reticent about doing business. Yesterday the quotation was 59.37½c., New York, for early delivery. Arrivals for the month to May 8 were 1000 tons, with the quantity afloat 425 tons. The London quotation yesterday for spot Straits was £232 12s. 6d., an advance of about £2½ since last week. As a whole the week has been more active than the preceding one, with total sales approximating 800 to 900 tons and with the tone yesterday more or less bullish and strong.

**Lead.**—With some of the large producers out of the market this metal has continued to grow scarcer until it has been almost impossible at times to secure it. The market has been fairly active and prices have advanced until yesterday the quotation was 10.45c., New York, and 10.25c., St. Louis, for early delivery. On May 2 the American Smelting & Refining Company advanced its price from 9c. to 9.50c., New York, but this has had no immediate influence on the market. It is reported that the Government has just bought 2500 tons for May-June shipment, but the price paid is a secret. This small amount is regarded as insignificant as compared with the ultimate requirements which probably will be large from July 1. It is believed that stocks will be low for some time to come with no tendency for prices to fall. The dominating influence continues to be the probable needs of the Government, and the question of an adequate supply to meet this and the general demand. Yesterday June delivery at New York sold at 10.50c., with prompt shipment from the West at 10.40c.

**Spelter.**—The interesting feature of an otherwise dull market is the official announcement of the zinc committee of the Council of National Defense that an arrangement has been entered into whereby Government pur-

chases will be made at 11.50c. per pound, delivered, for grade A, 11c. for grade B and 9c. for grade C metal. The latter being prime Western, the decision is regarded by some as a bull argument in the long run at least. It develops that in accordance with this arrangement 25,000,000 lb. have been contracted for with delivery over the next 12 months. An interesting phase is that the 9c. price is protected against a decline. It is stated as a fact, however, that with present ore prices some producers cannot make much profit. Further purchases by the Government are expected. Sales otherwise have been few in the past week and demand is not large. The quotation is 9.37½c., New York, or 9.12½c., St. Louis, for spot and May metal, at which price sales were made this week.

**Antimony.**—Spot or May metal is obtainable at 25c., New York, a decided decline since last week, due to arrivals by rail from the Pacific coast of Chinese and Japanese grades which were at once offered for sale.

**Aluminum.**—The market is quiet for spot metal which is quoted at 59c. to 61c. for No. 1 virgin metal, 98 to 99 per cent pure.

**Old Metals.**—The market is quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	29.00 to 30.00
Copper, heavy and wire.....	28.00 to 29.00
Copper, light and bottoms.....	25.50 to 26.25
Brass, heavy.....	19.00 to 19.50
Brass, light.....	15.00 to 16.00
Heavy machine composition.....	24.00 to 25.00
No. 1 yellow rod brass turnings.....	18.25
No. 1 red brass or composition turnings.....	20.00 to 22.00
Lead, heavy.....	9.00
Lead, tea.....	8.50
Zinc.....	7.50

### Chicago

MAY 7.—Buying has been active in the past week, especially in copper, and the market in copper, lead and tin has a healthier tone. The strength of lead is due not alone to a good demand, but to a limited supply. Tin, while strong, is in sufficient supply to meet an active demand. Spelter continues without interest. Antimony shows a heavy decline, largely because of large overland arrivals from the Far East. We quote as follows: Casting copper, 30c.; Lake, 32.50c.; electrolytic, 33c.; tin, carloads, 59.50c., and small lots, 61c.; lead, 10.50c.; spelter, 9.25c.; sheet zinc, 19c.; oriental antimony, slow at 28c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 24.50c.; copper clips, 24c.; copper bottoms, 22c.; red brass, 22c.; yellow brass, 17c.; lead pipe, 8c.; zinc, 6.50c.; pewter, No. 1, 35c.; tinfoil, 40c.; block tin, 45c.

### St. Louis

MAY 7.—Metals have been rather quiet during the week and the quotations at the close to-day on carload lots were, for lead, 10c. and strong; spelter, 9c. to 9.12½c. and weak. In less than carload lots, the quotations were: Lead, 11¼c.; spelter, 10½c.; tin, 65c.; Lake copper, 34c.; electrolytic copper, 33½c.; Asiatic antimony, 32c. In the Joplin district there was increased strength during the week in both lead and zinc ore, which resulted in an advance in the prices of both products of about \$5 per ton. Zinc blende sold, basis of 60 per cent metal, from \$65 to \$75 per ton, with the district average at \$69 per ton. Calamine was quiet at \$35 to \$40 per ton, basis of 40 per cent metal, with the district average at \$34 per ton. The second grade ores, particularly zinc blende, were very strong and sold up close to the premium grades. Lead was \$115, basis of 80 per cent metal, and the average for the week was \$114 per ton. On miscellaneous scrap metals we quote dealers' buying prices as follows: Zinc, 7c.; lead, 6c.; tea lead, 3.50c.; light brass, 12c.; heavy yellow brass, 13c.; heavy red brass and light copper, 19c.; heavy copper and copper wire, 22.50c.; tinfoil, 36c.; pewter, 25c.

Pettinos Brothers, manufacturers of foundry facings, etc., removed their main office May 1 from Bethlehem, Pa., to 25 Church Street, New York. They will still maintain an office in Bethlehem, but business will be transacted through the new headquarters at New York.



## PERSONAL

Joel W. Burdick, president of the West Penn Steel Company, Brackenridge, Pa., has been elected a director of the Bank of Pittsburgh, succeeding Rueben Miller, deceased.

Bradley Stoughton, of New York, secretary of the American Institute of Mining Engineers, will be the principal speaker at the first annual banquet of the Steel Treating Research Club of Detroit at the Hotel Statler, Saturday evening, May 26. His subject will be "Possibilities of Double Heat Treatment."

Augustus S. Blogden, formerly vice-president of the American Malleables Company, Buffalo, has been made president of the company and may later be located in New York.

A. L. Andrews, president Newport Rolling Mill Company and Andrews Steel Company, Newport, Ky., has returned from Sewells Point, Fla., where he spent the winter season.

On Saturday afternoon, May 5, J. A. Campbell, president of the Youngstown Sheet & Tube Company, gave a dinner at the Hotel Ohio, Youngstown, for about 175 employees of the shipping department. The dinner was given for meritorious work performed by the shipping clerks and other employees in the shipping department in March. Informal talks were given after the dinner by Mr. Campbell and other officials.

Charles A. Kafer has resigned as superintendent of the electrical department of the Saucon Plant of the Bethlehem Steel Company, South Bethlehem, Pa., and has been succeeded by A. J. Standing, formerly assistant superintendent of the electrical department of the Lehigh plant. K. M. Raynor has succeeded Mr. Standing. The resignations of William Boyd, master mechanic and E. C. Cavanaugh, superintendent of the electrical department, Lehigh Coke Plant, were tendered at the same time. The two positions have been combined and Harry Padley has been named as the new official.

B. T. Bechtel, for 10 years sales manager of the Pittsburgh office of the Mark Mfg. Company, Evanston, Ill., has been appointed assistant general manager of sales of the company, with headquarters at Evanston, Frank F. Corby being general manager of sales. Mr. Bechtel has been connected with the Mark Mfg. Company for about 15 years. His successor at Pittsburgh has not yet been appointed.

Edward A. Neill, formerly with the Consolidated Coke Company, is now identified with William Wieman, dealer in pig iron, coal and coke, with offices in the Union Arcade Building, Pittsburgh.

George F. Alderdice, vice-president of the Brier Hill Steel Company; Julius Kahn, president of the Trussed Concrete Steel Company, and C. S. Robinson, vice-president of the Youngstown Sheet & Tube Company, have been elected directors of the Chamber of Commerce of Youngstown.

Ralph E. Graves, formerly Pittsburgh sales manager of the Cleveland Punch & Shear Works Co., Cleveland, has been made sales manager of the new Chicago office, opened by this concern on May 1. Mr. Graves is very well known in the machinery trade in the Central West, and has been connected with the Cleveland Punch & Shear Works Co. for seven years, prior to that time being with the Variety Iron & Steel Works Co., Cleveland. T. J. McNamara succeeds Mr. Graves as sales manager of the Pittsburgh office.

H. H. Pleasance has been appointed manager of sales of the United Alloy Steel Corporation, Canton, Ohio. E. D. Rogers, who has been vice-president and manager of sales, continues as vice-president of the company. Mr. Pleasance has been assistant manager of sales for the company for a number of years.

Alfred Marshall, Marshall & Huschart Machinery Company, Chicago, is a member of an expedition which is being sent to Labrador by the Carnegie Institute and

the National Geographical Society. The party is now en route. Mr. Marshall is a student of ornithology.

Ralph W. Clark, of the New York staff of Rogers, Brown & Co., goes this week to Plattsburgh, N. Y., having been selected for the officers' reserve corps which will be in training there for the next three months. He had served for several weeks in the Plattsburgh camp of 1916.

J. E. Johnson, Jr., consulting engineer, New York, has returned from a five-months' trip to China on professional business.

Marshall Prentiss, secretary and treasurer of Henry Prentiss & Co., Inc., New York, has joined the Officers' Training Camp at Plattsburgh, N. Y., and has been assigned to Company 14, which reports for duty May 12.

C. I. Gibson has been appointed manager of the Guernsey works, Cambridge, O., of the American Sheet & Tin Plate Company, succeeding Herbert M. Steele, who resigned recently.

Barton L. Little, who has been for a number of years in charge of the Western interests of the United Alloy Steel Corporation, Canton, Ohio, has tendered his resignation, effective June 1, to join the Interstate Iron & Steel Company, Chicago, as general manager of sales.

Bert A. Quayle, for 15 years with the Standard Parts Company, Cleveland, has been appointed manager of sales of the company's rim and tube division, formerly the Standard Welding Company, in place of P. W. Gilbert, who has been made assistant to the manager.

C. E. Pope, formerly president of the Phillips Sheet & Tin Plate Company, Weirton, W. Va., has been made chairman of the board of directors of the American Metal Cap Company, Brooklyn, N. Y., in which he has acquired an interest.

William Kent, formerly chief draftsman of the Republic Iron & Steel Company, Youngstown, Ohio, has resigned to accept a similar position with the Mark Mfg. Company at Chicago.

M. G. Butler, formerly with the Erie Railroad, at Youngstown, Ohio, has been appointed traffic manager of the Mahoning Steel Company, Youngstown.

Charles McNichol, district freight agent of the American Bridge Company, Pittsburgh, has been nominated for president of the Traffic Club of Pittsburgh. The nomination is equivalent to election, as there is no opposition.

A. L. Lewis, formerly superintendent of the Sleeper & Hartley, Inc., designer and builder of automatic wire coiling machinery, Worcester, Mass., has been appointed superintendent of a new plant which the company is to build for manufacturing wire nail machinery.

F. S. Reitzel, formerly controller of the Pennsylvania Steel Company, Steelton, Pa., and later of the American Iron & Steel Mfg. Company at Lebanon, Pa., has been appointed controller of Manning, Maxwell & Moore, Inc., New York City. Mr. Reitzel started in the steel business as an office boy in the Steelton office of the Pennsylvania Steel Company. He was gradually promoted from one position of trust to another until in 1910 he was made the controller of the Pennsylvania Steel Company. When the Bethlehem interests purchased the Steelton plant he was offered and accepted a like position with the American Iron & Steel Mfg. Company. He became associated with B. Dawson Coleman in the sale of the Lebanon plant and has just completed his work of liquidating trustee in the distribution of bonds to stockholders.

John D. Hurley, who has been vice-president of the Independent Pneumatic Tool Company, Chicago, since its organization, was elected president at a special meeting of the board of directors held in Chicago, May 3. He succeeds the late James Buchanan Brady. Mr. Hurley is well known in the pneumatic tool business, having been identified with that industry since pneumatic tools were first placed on the market. Ralph S. Cooper, who has been manager of the New York office

for the past 12 years, was elected vice-president, and Robert T. Scott, manager of the Pittsburgh branch, was elected a director and member of the executive committee.

C. D. Dyer, vice-president of the Shenango Furnace Company, Pittsburgh, has been appointed a member of a sub-committee of the committee on raw materials of the Council for National Defense. This committee is charged with looking after supplies such as pig iron, ore, lumber, copper and other essentials to the successful prosecution of modern warfare and will also attend to details of lake transportation.

William Piggott, president of the Seattle Car & Foundry Company, Seattle, and vice-president of the Pacific Coast Steel Company, has been re-elected to serve his second term as president of the Manufacturers' Association of Seattle.

H. C. Cochrane has been placed in charge of a branch office which the Pressed Steel Tank Company has opened in the Woolworth Building, New York.

M. A. Quigley, Mount Carmel, Pa., has been appointed inspector in the State Department of Commerce and Labor, to specialize in machine shop inspection.

### Chicago Machinery Club Making Rapid Progress

The Machinery Club of Chicago, at a meeting held April 30, elected the following officers:

President, Clyde W. Blakeslee, Abrasive Material Company; first vice-president, F. Le Roy Peterson, Hendey Machine Company; second vice-president, John D. Powell, L. S. Starrett Company; treasurer, Arthur L. Beardsley, Cleveland Twist Drill Company; secretary, Norton A. Booz, Machinists' Supply Company; directors, Horace A. Stocker, Stocker-Rumely-Wachs Company; Edward R. Welles, Charles H. Besly & Co.; John D. Porter, Marshall & Huschart Machinery Company; Harry E. Witham, Warner & Swasey Company; E. L. Beisel, Gardner Machine Company; Oscar P. Wodack, of James J. Clark, Jr., and Ambrose A. Bowyer, *American Machinist*.

The organization now has a membership of over 300, and is making rapid progress toward securing permanent quarters which will be equipped with a restaurant, meeting rooms, information bureau and the various appurtenances of a luncheon club. Those in the machinery and supply and associated trades are eligible to membership.

### Iron and Steel Institute Directors

At the annual meeting of the American Iron and Steel Institute held in New York, Monday, May 7, the following directors were re-elected for the three-year term ending in 1920: L. E. Block, Inland Steel Company; A. C. Dinkey, Midvale Steel & Ordnance Company; James A. Farrell, United States Steel Corporation; Elbert H. Gary, United States Steel Corporation; Robert Hobson, Steel Company of Canada, Ltd.; Charles M. Schwab, Bethlehem Steel Corporation; Powell Stackhouse.

O. J. Abell, 565 Washington Boulevard, Chicago, formerly Western editor of THE IRON AGE, has been appointed Western representative of the American High Speed Chain Company, Indianapolis; the Howe Chain Company, Muskegon, Mich.; the Union Chain & Mfg. Company, Seville, Ohio; the R. H. Beaumont Company, Philadelphia; the Barber-Foster Engineering Company, Cleveland; the Canton Foundry & Machine Company and Edgar E. Brosius, Pittsburgh. Through these and other connections he is prepared to offer equipment for the handling of materials and the transmission of power, including silent high-speed chain for power drives, steel roller and bushing chain for conveying and power purposes, one-man, motion-storage trucks, cranes, hoists, trolleys, portable cranes, coal and ash handling installations, suspension charging rigs for open-hearth and electric furnaces, grab buckets, malleable and steel buckets, pressed steel hangers and power transmission accessories.

## OBITUARY

CHARLES DUNCAN FRASER of Ardsley-on-Hudson, died May 7 following an operation at the Presbyterian Hospital, New York. Mr. Fraser was born in South Shields, England, in 1857 and came to the United States in 1877. When a young man, he became connected with the ore department of the Carnegie Steel Company at Pittsburgh and was for many years secretary of the Oliver Iron Mining Company, which originally conducted the iron ore operations of the Carnegie Steel Company and from 1901 of the United States Steel Corporation. He retired from active business life about four years ago. Mr. Fraser was for a number of years actively connected with Thomas F. Cole and others prominent in the organization and operation of leading copper companies. He was a director of the Hedley Gold Mining Company, Greene Consolidated Copper Company, Old Eureka Mining Company and a member of the Engineer's and a number of other clubs. He never allowed his business activities to lead him away from cultural pursuits. As an evidence of the scholarly work which he carried on in later years, he received from Lafayette College the honorary degree of Master of Science. He is survived by his wife and a son, Duncan, a junior at Harvard.

EDOUARD SALADIN, the French Government representative in this country in the purchase of railroad material and supervisor of the making here of shell steel, who died Feb. 12 after a two months' illness resulting from a paralytic stroke, was earlier in his career engaged in this country. Following work in Norway, Indo-China, Spain and Mexico, he was manager of a French mining company operating at Junction City, Trinity County, Cal. He will, of course, be remembered chiefly as a leading figure of the ordnance and steelmaking institution of Schneider & Co., Le Creusot, France. He was a prominent member of the International Congress for Testing Materials, held in New York in 1912, where linguistic abilities like his were at a premium. He was born at Nancy, France, in 1856, and was graduated first in his class in 1877 from the Ecole Polytechnique, the school for officers in France, and then in 1880 from the Ecole des Mines de Paris. Among his numerous contributions to metallurgical advance may be mentioned a new autographic method to ascertain the critical points of steel and steel alloys.

EDWIN J. HADDOCK, formerly of New York, died in Pittsburgh, April 11, as the result of an automobile accident. Mr. Haddock was a mechanical engineer and held many positions of responsibility. He was for several years with Thomas A. Edison; chief draftsman for the Robins Conveying Belt Company, New York; chief engineer for the Jeffrey Mfg. Company, Columbus. Later he was with the Tennessee Coal, Iron & Railroad Company, Birmingham, Ala.; in private practice in Milwaukee; and was chief engineer of the Edgewater Steel Company, Pittsburgh, at the time of death.

LOUIS R. POMEROY, for several years consulting engineer on railways and electricity, died suddenly at his home in Orange, N. J., May 7. From 1886 to 1890 he was a special representative of the Carnegie Steel Company, and he held a similar position with the Cambria Steel Company. Later he was assistant general manager of the Schenectady Locomotive Company. At the time of his death he was with the Safety Car Heating & Lighting Company. He was born at Port Byron, N. Y., in 1857.

FRANK CONNELL, secretary and treasurer of the Skinner Engine Works and vice-president of the Union Iron Works, Erie, Pa., died suddenly April 28, being stricken while at his desk.

The adjourned annual and special meetings of stockholders of the Pittsburgh Coal Company will be held in that city June 5.



# Machinery Markets and News of the Works

## WAR SPUR NOT KEEN

### Delays in Congress a Drag on Activity

#### General Electric Company's Big List—Domestic Trade Strong—Wood-working Machinery Inquiry Heavy—Bethlehem Buys Cranes

The transition of industry to a war footing goes on with varying pace in the different machinery centers. All points that reflect strong activity attribute the keenness of demand to Government business. Annoyance is felt in some quarters at the frequency with which intending purchasers maintain machines are needed for Government work, where evidence is sometimes lacking to bear out the assertion.

The feature of the week was the appearance of a list of from 150 to 200 tools for the Schenectady plant of the General Electric Company, covering a wide range of shop equipment. Some large requirements of munition makers who have virtually closed for Government work are still held up. The Rock Island Arsenal is likely to be a big buyer before long. The stress of demand is everywhere for planing, milling, boring and drilling machines and for large-sized lathes. Manufacturers in the Cleveland district express fear that enlistment will upset the already inadequate labor market.

The Bethlehem Steel Company has bought about 25 cranes of 5-ton and 10-ton capacities for its Lehigh plant. Crane-making plants are filled up to the limit with orders.

Manufacturers of wood-working machinery have done a heavy business with builders of submarine chasers and this is now being followed by urgent inquiry from prospective builders of the wooden fleet. Deliveries on this class of equipment can be made at once on some machines, but are two months off on the larger sizes.

Second-hand tools are scarce and recent offerings of them have been at rather high prices. Those available at reasonable figures are quickly taken up. But few used tools from the munition plants have been taken by shops in New England.

## New York

NEW YORK, N. Y., May 9, 1917.

The General Electric Company came before the trade last week with a list of between 150 and 200 machine tools for its shops at Schenectady, N. Y., including lathes, milling machines, grinding machines, boring machines, drill presses and other general shop requirements. No other large lists have appeared, but a number of companies, particularly munition makers, are anxious to close in some cases for over 100 machines, which they will require at once upon securing authority from Washington to go ahead upon proposed Government work. Some plant officials are considerably upset at their inability to get this kind of work started, as they have been advised that deliveries promised cannot hold much longer and that new deliveries will be further off. The general domestic machine tool situation shows little change as to emphasis of demand or period for delivery. Small price advances continue to be made, this week being recorded on some quotations for power presses and milling machines. No improvement in delivery has taken place. The urgent de-

mand for milling, shaping, radial drilling and especially horizontal boring machines persists.

Export business holds active despite the many difficulties encountered. Sales of small lots of tools for various European countries are quite frequent. Russian demand continues in spite of unsettled conditions and the difficulty in shipping to destination. Much trouble is encountered in securing shipping permits to England and it is believed that a policy is in effect to discourage the importation of machinery into that country. Less difficulty is found elsewhere in securing cargo space than is generally supposed. Many cancellations attributed to this cause are due to inability to finance the shipments.

Recent sales of wood-working machinery, while largely increased over what they were a few weeks ago, have been for the most part to builders of submarine chasers, not to builders of wooden cargo boats under the Government plan. There is no close gage of just how much equipment will be taken for the latter work, and the fact that the Federal Shipping Board has not definitely decided on the original proposition of 1000 wooden boats leaves the entire matter in an indefinite state. It is evident from their contact with dealers that a great many prospective builders lack first-hand knowledge of shipyard work to an extent similar to some munition makers at the start of the war. Some large yards are contemplated. One inquiry for locomotive cranes calls for 16 cranes, one for each way, and 10 additional cranes for service work about the plant. A moderate-sized yard, consisting of, say, three ways, is estimated to require about \$20,000 worth of wood-working machinery and also metal-working tools. Some prospective shipbuilders entertain the delusion that they can secure equipment presto, by merely stating that they intend to build wooden ships. Others expect to get a Government order which will compel machinery dealers to hand over tools. Many fail to realize that other industries are equally vital and that equipment cannot be had immediately in most cases. Manufacturers of wood-working machinery have no large stocks ahead, partly on account of the difficulty, now long existing, of getting materials. The larger plants are booked for two or three months ahead. An average delivery on this equipment is from 60 to 90 days. Large machines, which are the most needed in wooden shipbuilding work, are the hardest to get and require the most time to manufacture.

The Bethlehem Steel Company recently purchased 24 cranes for its Lehigh plant, including 13 Pawling & Harnischfeger 5-ton and 12 Shepard 10-ton 67-ft. span cage-controlled. It also purchased two 2-ton hoists and two 3-ton monorail hoists for its Sparrows Point plant. The Crucible Steel Company of America purchased the seven cranes recently wanted for its Atha plant. Inquiries are out for crane equipment for South American mining plants, including one 75-ton and one 5-ton units for the Chile Exploration Company and three 15 and one 25-ton units for the Braden Copper Company in Chile. Westinghouse, Church, Kerr & Co., Inc., have purchased several 5 and 10-ton cranes for various industrial plants which it has under construction. Domestic inquiry for locomotive cranes is strong, but orders are cut down on account of uncertainty as to how war preparations will affect industrial work. Manufacturers of overhead cranes have their shops full and in many cases are not seeking business.

The Cameron & Kaulfers Company, 56 Marshall Street, Elizabeth, N. J., has been formed by J. R. Cameron and H. Kaulfers for the manufacture of wood patterns and metal match plate work.

The Hewitt Bearing Metal Company, which has been operated at Berkeley Avenue and Sixth Street, North Newark, N. J., by C. J. Franz and R. G. Holbrook, has changed its name to the Franz-Holbrook Bronze Company.

The K. & B. Electrical Equipment Company, 347 Second Avenue, New York, recently incorporated with a capital stock of \$25,000, is manufacturing X-ray and electro-therapeutical specialties. Leo A. Kotraschek is president, William W. Mowry is vice-president and secretary and Hugo Brodsky is treasurer.

The Habirshaw Electric Cable Company, 10 East Forty-third Street, New York, has purchased from the New York Central Railroad property on Saw Mill River Road at Yonkers, N. Y., on which it will erect a one-story brick factory building, 60 x 242 ft., to be used as a wire-drawing department. It will cost about \$60,000. G. F. Waterbury is secretary.

The Moore Steam Turbine Corporation, Wellsville, N. Y., has increased its capital stock from \$160,000 to \$260,000 for



the purpose of providing additional working capital, and additional equipment, so as to take care of the very large volume of business in steam turbines and reduction gears which is being received.

The Newark Gear Cutting Machine Company, 69 Prospect Street, Newark, N. J., has filed plans for improvements in its machine shop to cost about \$4,100.

Fire April 29 destroyed the power plant and boiler house, including considerable electric equipment, of the Hewitt Steel Corporation, Chapel Street and Lister Avenue, Newark, N. J., with loss estimated at \$10,000.

The West End Wagon Works, Newark, N. J., has been organized to operate a wagon manufacturing and repair plant at 586 South Twelfth Street. Jacob Feldman, 455 South Thirteenth Street, is president.

The General Electric Company, Harrison, N. J., is taking bids for a four-story and basement, brick and reinforced-concrete plant, 108 x 500 ft., on Lillie Street, near Seventeenth Street, Newark. John H. and Wilson C. Ely, Fireman Building, Newark, are the architects.

The Overland Tire Company, Newark, N. J., recently incorporated with a capital of \$100,000, has acquired property at 15-25 River Street, for a plant for the manufacture of tires. The initial operations will include a floor space of about 40,000 sq. ft. James A. Whitman, Grantwood, N. J., is president.

Leiman Brothers, 68 Bonykamper Avenue, Newark, N. J., manufacturers of jewelers' machinery, have filed plans for a new one story building, 48 x 56 ft., at 179-181 Christie Street, to cost about \$3,000.

The Pittsburgh Plate Glass Company, Pittsburgh, Pa., has awarded a contract for a one-story branch plant, 200 x 225 ft., at Elizabeth Avenue and Peddie Street, Newark, N. J., to cost \$60,000. The Levering & Garrigues Company, 552 West Twenty-third Street, New York, has the contract.

The Loesser Knitting Needle Company, Newark, N. J., has been incorporated with a capital of \$100,000 to manufacture knitting machine needles, etc. Ernest Loesser, Ernest Loesser, Jr., and Max Schenke are the incorporators.

The plant of the Boeger-Meyer Machine & Tool Company, 61 McWhorter Street, Newark, N. J., is being operated at full capacity in the production of special machinery. A large order has recently been completed for machines for the manufacture of waxed papers.

John F. Lauritz, Jersey City, N. J., and associates have incorporated in Delaware, the Scholtz Spring Wheel Company, with a capital of \$250,000 to manufacture a patented spring wheel and steel tires. Brino H. Fichtl, Weehawken, and H. H. Walter, New York, are the other incorporators.

The Morris Process of New Jersey, Inc., Jersey City, N. J., has been incorporated with a capital of \$150,000 to manufacture power-distributing machinery, engines, motors, etc. C. H. Jarvis, P. L. Neiser and John L. Turner are the incorporators.

The Elco Company, Avenue A, Bayonne, N. J., manufacturer of motor boats, marine engines, etc., is making extensions in its plant to increase the capacity. The company is negotiating with the city for the vacation of North Street, running through its works, for building expansion. Riparian rights have been obtained to cover a large tract at North Street and Newark Bay.

The American Cotton Oil Company, 27 Beaver Street, New York, is reported planning the erection of a new plant on a tract at Humphrey and Newman avenues and First and Fourth streets, Bayonne, N. J.

Henry Lysholm, Woodbury, N. J., and associates, have incorporated in Delaware the New Jersey Shipbuilding Company, with a capital of \$1,000,000, to operate a boat and shipbuilding plant. Haakon E. Norbom, Germantown, Philadelphia, is also a promoter.

The Standard Aero Corporation, Plainfield, N. J., manufacturer of aeroplanes, will build an addition, 120 x 175 ft., to cost about \$14,000.

The Pond Machine Tool Company of the Niles-Bement-Pond Company, at Plainfield, N. J., has awarded a contract for further extensions to its plant, consisting of a two-story brick addition, 70 x 125 ft., to cost \$150,000. Henry E. Baton, Twelfth and Sansom streets, Philadelphia, has the contract for erection.

Fire May 3 destroyed the plant of the Peg Lock Block Company, manufacturer of block toys, 311 Pennsylvania Avenue, Paterson, N. J., with loss estimated at \$30,000.

The Thomas Smith Machinery & Supply Company, Paterson, N. J., has been incorporated with a capital of \$25,000 by Thomas Smith, John C. Ryle and C. Lambert.

The American Forging Company, Lakeview, near Paterson, N. J., has been incorporated with a capital of \$100,000 to establish a local plant. Property has been acquired on South Fifth Street, near Getty Avenue, for the proposed works.

The incorporators are Peter A. Cavicchia, Joseph H. Steinhart and Frederic W. Schlosstein, all of Newark. Samuel S. Tompkins, South Fifth Street, Acquackanonk Township, is local representative.

The Roessler & Hasslacher Chemical Company, Perth Amboy, N. J., has filed plans for a two-story addition to its plant, 63 x 124 ft., to cost \$15,000. It will also build a one-story garage, 50 x 88 ft., to cost \$9,000, equipped to handle its own repair and service work.

The Downey Shipbuilding Corporation, New York, recently incorporated in Delaware with capital of \$5,000,000, has filed notice of increase in its capital to \$10,000,000. The company proposes to build a shipbuilding plant for the manufacture of freighters at the steel works of Milliken Brothers' plant at Milliken, Staten Island. Wallace Downey, 120 Broadway, is president.

The Rathbone-Sard Electric Company, Albany, N. Y., will soon commence the operation of its new plant on North Ferry Street, recently completed, for the manufacture of electric stoves, cooking devices and similar specialties. The new factory, with floor area of about 70,000 sq. ft., will have a total capacity of about 50,000 electric ranges a year; all machinery will be electric-driven with individual motor drive. The initial working force will number about 150 men. The company is allied with Rathbone, Sard & Co., manufacturers of stoves and ranges, with plants adjoining. Russell E. Sard is president of both companies, and H. P. G. Nostrand is vice-president and general manager.

The Erie Pump & Engine Works, Medina, N. Y., has been incorporated with capital of \$50,000 to operate a plant for the manufacture of pumps and engines and to engage in foundry work. C. S. and F. R. Sweet and F. Marion Roler, Medina, are the incorporators.

The Star Iron Works Company, Gowanda, N. Y., has been incorporated with capital of \$75,000 to manufacture steel and sheet metal products. W. W. Watson, C. E. Guschwind and D. H. Foster are the incorporators.

The United Shoe Machinery Company, Boston, Mass., it is reported, will establish a new branch plant at Binghamton, N. Y.

The Dempsey Oil Engine Corporation, Eddyville, N. Y., has been incorporated with a capital stock of \$500,000 to manufacture oil engine devices. A. W. Britton, S. B. Howard and L. H. Gunther, 28 Nassau Street, New York, are the incorporators.

The Century Steel Company of America, 120 Broadway, New York, is having plans prepared for a one-story steel plant to be erected on Delafield Street, Poughkeepsie, N. Y. It has just increased its capital stock from \$15,000 to \$500,000.

The National Conduit & Cable Company, Hastings-on-Hudson, N. Y., has been incorporated with a capital stock of \$8,750,000 to manufacture wires, cable, conductors, etc. The incorporators are P. S. Williams, 579 Seventy-third Street; J. W. Rhoades, 530 West 113th Street, New York, and T. M. Malone, 404½ Henry Street, Brooklyn.

The Semet-Solvay Company, Solvay, N. Y., will build a nitrates plant at Split Rock, Solvay.

The Stolp Company, Geneva, N. Y., has been incorporated with a capitalization of \$50,000 to manufacture special machinery, hardware, etc. The incorporators are F. H. Stolp, B. L. Mourse and L. G. Hoskins.

The Syracuse Alloy Steel Company, Syracuse, N. Y., F. C. Raab, C. A. Lawton and M. C. Warwick, directors, has filed articles for incorporation with a capital stock of \$25,000 to manufacture machinery, factory supplies, tools, etc.

The Jayville Iron Works, Jayville, N. Y., has completed plans for a separate house, 40 x 80 ft., which is to be built this spring. William Hughes is superintendent.

The Erie Pump & Engine Works, Medina, N. Y., has been incorporated with a capitalization of \$50,000 to manufacture pumps and engines and do a general foundry business. C. S. and R. F. Sweet and F. Marion Roler are the directors.

The General Electric Company, Schenectady, N. Y., has let general contract for a foundry building, 125 x 525 ft., one and two stories, with wing 36 x 250 ft., one story, to cost \$400,000.

The Taylor-Shantz Company, Rochester, manufacturer of tools and dies, has let contracts for a two-story addition, 79 x 128 ft., to its machine shop on Mill Street.

The American Radiator Company, Buffalo, has let contracts for a structural steel and concrete addition, 100 x 200 ft., to its Pierce plant at Elmwood and Hertel avenues and the New York Central Railroad Belt Line.

The Reliance Air Brake Company, Buffalo, has been incorporated by W. F. Schwartz, E. C. Norton, Buffalo, and F. H. Dukessmith, Meadville, Pa., to manufacture air brake apparatus and supplies. The capital stock is \$200,000. Arrangements are being made for the leasing or erection of a plant.

The Transmission Ball Bearing Company, Buffalo, N. Y., W. Chambers, manager, is building an addition, 60 x 96 ft., and 24 x 60 ft., to its plant at Military Road, Kenmore Avenue and the New York Central.

Mitchell & Grennelle, Inc., Tuckahoe, N. Y., capitalized at \$100,000, has been incorporated by J. H. Grennelle and A. M. Mitchell to make iron and steel products and insulating materials.

The Fedders Mfg. Company, Buffalo, N. Y., manufacturer of automobile radiators, is building a two-story brick and steel addition to its plant at Tonawanda Street and West Avenue.

## New England

BOSTON, MASS., May 7, 1917.

The demand for planers, boring mills and milling machines continues to be the chief feature of the machinery market. Planer manufacturers are sold up to at least the end of the year and in some cases for much longer periods. Makers of boring mills are nearly a year behind on deliveries and some manufacturers of milling machines are but little better off. The builders of grinding machinery are also sold up for months ahead, but there has been a noticeable dropping off in inquiries and orders in the last few weeks on cylindrical grinding machines. Inquiries for internal grinding machines continue in good volume, but the sales are in small lots to widely scattered plants. A considerable part of the new demand can be directly traced to Government business. Demand for radial drills, particularly for the heavier machines with 4-ft. arms or larger, is not being satisfied to any large extent.

A marked dropping off in the call for small sizes of lathes is noted and a few makers are in a position to give reasonably prompt delivery on them. The situation in regard to large lathes is just the opposite and it is difficult to secure 30-in. lathes and larger. A government order for 30, 36 and 42-in. lathes, on which bids closed April 17, has not been awarded. It is understood that New England distributors for some of the leading lathe manufacturers were unable to secure sufficiently early delivery dates from the makers. The value of this requirement exceeded \$60,000 and the penalty for late delivery was changed from the customary 1/30 of 1 per cent a day to 1/15 of 1 per cent a day; this change probably being one factor in the prices submitted by the bidders.

Machinery jobbers report the sale of many new machines of all kinds, the demand coming from the many small shops which are taking advantage of their present prosperity to replace the old and second-hand machinery with which they hurriedly equipped themselves when the boom started. Used and rebuilt machine tools of standard and well-known makes are moving freely, however, and the market is absorbing them as fast as offered. But few of the machine tools from the dismantled munitions plants have been bought in New England and practically no demand exists for such equipment.

Among the new Delaware corporations, formed in April, of interest to this section were the Stanley Motor Carriage Company, with authorized capital of \$13,100,000, and the New London Shipbuilding Corporation, with authorized capital of \$10,000,000.

The Taylor & Fenn Company, Hartford, Conn., is to build an addition, 60 x 106 ft. and 44 x 60 ft., two and four stories.

The Scovill Mfg. Company, Waterbury, Conn., is building an addition, 102 x 193 ft., one story.

The American Fork & Hoe Company, Ely Works, St. Johnsbury, Vt., is having plans drawn for a power plant, 50 x 50 ft., three stories.

The Metal Specialty Mfg. Company, Waterbury, Conn., has been authorized to increase its capital stock from \$25,000 to \$100,000.

The Clayton Mfg. Company, Bristol, Conn., maker of cutlery and hardware, has been incorporated with authorized capital stock of \$100,000 by Oscar W. Edwards, Northampton; Frederick C. Winter, Long Beach, N. Y.; William M. Bowes, New York City; Harry A. Hannum and William R. Bowes of Bristol.

The Vulcan Iron Works, New Britain, Conn., has awarded a contract for an additional story to its office building.

The Lincoln Twist Drill Company, Taunton, Mass., has been incorporated with authorized capital stock of \$1,000,000 by John C. Rice, Clement R. Ford and Otis T. Russell.

The Eagle Lock Company, Terryville, Conn., is to begin the erection of 21 cottages for its employees.

The General Welding & Equipment Company, Boston, Mass., has been incorporated with authorized capital stock of \$50,000 by Thomas F. Stoddard, Adolf Krebs and Fred Joy.

The Bristol Brass Company, Bristol, Conn., is having plans drawn for 25 two-family houses for its workmen.

The Moore Drop Forge Company, Springfield, Mass., will start work at once on an office building, 50 x 89 ft., one story, and a garage, 38 x 58 ft.

The Billings & Spencer Company, Hartford, Conn., has sold its plant at Dividend, Rocky Hill, Conn., which has not been used by the company since it acquired its new plant in Hartford. One of the smaller buildings has been occupied by the Lennox & Kinghorn Drop Forging Company. The present owners of the plant are Suisman & Blumenthal, Hartford, who decline to state the use which is to be made of it.

A group of four companies, the Gile Aeroplane Engine Company, the Gile Stationary Engine Company, the Gile Submarine Engine Company, and the Gile Tractor Engine Company, Boston, Mass., each with authorized capital of \$50,000, has been incorporated. C. H. Hutchinson is president and Herbert A. Palmer, 50 Congress Street, Boston, is treasurer of each company.

The New London Ship & Engine Company, Groton, Conn., is having built by the Thames Shipyard a floating machine shop, 30 x 130 ft., which will be used for attendance on submarines during trials. The float will be towed to the point where tests are to be conducted and will have a complete machine-shop equipment.

The Coto-Coil Company, Boston, Mass., has been incorporated with authorized capital stock of \$100,000 to manufacture machines for electric coil winding. Robert A. Leeson is president, and Frank N. French, 95 South Street, is treasurer.

The R. B. Phillips Mfg. Company, Worcester, Mass., suffered a \$10,000 water loss April 29, when a small fire set off the automatic sprinkler system.

George W. Dover, Inc., Providence, R. I., is a new corporation, with authorized capital stock of \$20,000, formed to manufacture jewelers' machinery and findings. The incorporators are George W. Dover, 50 Columbia Avenue, Cranston, R. I.; Benjamin Peckham and Frederick H. Brotesman.

The Vitrified Wheel Company, Westfield, Mass., has been incorporated with authorized capital stock of \$53,300. The directors are John G. Robbins, president; Francis R. Parks, Brookline, treasurer; and George L. Gaylord.

The Stephen Richard Company, Southbridge, Mass., cutlery manufacturer, is contemplating additions to its plant and power equipment.

The Portable Electric Searchlight Company, Boston, Mass., has been incorporated with authorized capital stock of \$40,000 by N. K. B. Brooks, president; Frank M. Lawrence, 104 Faneuil Hall Market, Boston, treasurer; and D. E. Hall.

Robert D. Alger, West Bridgewater, Mass., will begin at once the erection of an iron foundry, 50 x 70 ft., opposite the railroad station.

Sleeper & Hartley, Inc., 58 Prescott Street, Worcester, Mass., has leased additional space there and have begun a new plant to be devoted to the manufacture of its improved wire nail machinery.

## Baltimore

BALTIMORE, MD., May 7, 1917.

The Maryland Shipbuilding Company, Baltimore, has been incorporated with \$1,000,000 capital stock. Formal announcement of the organization of the company has been made. It will be managed by the following officers: President, Charles E. F. Clarke, president of the Pennsylvania Water & Power Company, Lexington Street Building, Baltimore, who also is vice-president of the Consolidated Gas, Electric Light & Power Company; vice-president and general manager, Thomas Benson, formerly chief engineer of floating equipment of the Baltimore, Chesapeake & Atlantic and the Maryland, Delaware & Virginia railroads; secretary and treasurer, C. C. Pusey, secretary of the Industrial Corporation, United States Fidelity & Guaranty Building; directors, J. E. Aldred, New York and Baltimore; Charles E. F. Clarke, B. Howell Griswold, Jr., M. Ernest Jenkins, John M. Dennis and John R. Bland.

The formation of the company was brought about through the efforts of Mr. Aldred when the Government decided to build a large number of wooden vessels. It is planned by the company to turn out 12 per year.

In the announcement of the formation of the company it is stated that the Government will contract for all the wooden vessels it can turn out. The initial plans call for a plant that will employ about 2000 men. The site is located on deep water. For several weeks men, machinery and materials necessary have been assembling. Plans are laid for a permanent industry on a scale of considerable magnitude.

The Dukehart-Denise Company, 100 West Fayette Street,

Baltimore, has been incorporated with \$25,000 capital stock to deal in machinery, iron, brass and other metals. The incorporators are Morton McL. Dukehart, Edwin S. Denise and Louis Windholz.

The Bowling Green Light & Power Company, Bowling Green, Va., has been incorporated with \$10,000 capital stock. B. F. Borkey is secretary.

The Acme Electric Works, Norfolk, Va., has been incorporated with \$50,000 capital stock. J. H. Hare is secretary.

## Philadelphia

PHILADELPHIA, PA., May 7, 1917.

The following list of mechanics and artisans urgently needed at the League Island Navy Yard, Philadelphia, gives an excellent line on wages now offered by the Government for certain classes of workers: Nine boatbuilders, at \$3.04 to \$4 a day; five riggers, at \$2.88 to \$3.76 a day; five riggers' helpers, at \$2 to \$2.48 a day; twelve shipfitters, at \$4.24 a day; fourteen shipwrights, at \$3.04 to \$4 a day; fifteen drillers, at \$3.04 a day; twenty coppersmiths, at \$3.28 to \$4.24 a day; twenty coppersmiths' helpers, at \$2 to \$2.48 a day; ten laborers, at \$1.76 to \$2.24 a day; twenty-one painters, at \$2.80 to \$3.60 a day; fifty painters' helpers, at \$2 to \$2.48 a day; boilermakers, at \$3.28 to \$4.24 a day, and boilermakers' helpers, at \$2 to \$2.48 a day.

The Arguto Oilless Bearing Company, Berkley and Wayne avenues, Philadelphia, manufacturer of pulleys, bearings and hangers, is taking bids for the erection of an addition to its plant.

The Hunter & Dickson Company, 245 Arch Street, Philadelphia, manufacturer of wrought pipe, steam fittings, etc., has increased its capital from \$150,000 to \$500,000 for expansion.

The De Long Hook & Eye Company, Broad and Wallace streets, Philadelphia, manufacturer of needles, hooks and eyes, and metal specialties, is planning the erection of an addition to cost about \$200,000. No date has been announced for the construction, but a fund of \$100,000 has been appropriated for early inauguration of work.

Schneider Brouman, Van Dyke and Paul streets, Philadelphia, has filed plans for improvements and additions in his foundry to cost about \$8,000.

The Union Machine Works & Iron Foundry, Inc., 1821 South Water Street, Philadelphia, specializing in iron and steel castings, etc., has acquired the buildings occupied from 1821-29 South Water Street, providing an area 108 x 157 ft.

The Talbot Air Lift Company, Philadelphia, has been incorporated with capital of \$20,000 to manufacture pumping machinery. L. T. Edwards, Llanerch, is treasurer.

F. Weber & Co., 1125 Chestnut Street, Philadelphia, manufacturers of paper goods, have awarded a contract for the erection of a five-story and basement plant, 42 x 150 ft., at a cost of \$60,000. The Freund Construction Company, Bulletin Building, is the contractor.

The American Metal Company, Germantown, Philadelphia, is taking bids up to May 11 for a two-story, brick and concrete plant, 60 x 325 ft., to be erected at its works on Stenton Avenue. Kern Dodge, Morris Building, is engineer.

The Bernstein Mfg. Company, Ford Street and Allegheny Avenue, Philadelphia, manufacturer iron and steel goods, will build an addition on Third Street to cost about \$7,000.

Charles Lennig & Co., Inc., 112 South Front Street, Philadelphia, manufacturer of chemicals, has awarded a contract for the erection of a one-story addition to its plant, 60 x 200 ft., at Bridesburg, to cost about \$17,000. F. A. Havens & Co., 845 North Nineteenth Street, are the contractors.

The Graphic Arts Company, Philadelphia, manufacturer of acid blast etching machines, has removed its plant from 940 North Ninth Street to 1429 North Twenty-first Street. Louis E. Levy is president.

The American Bridge Company, Trenton, N. J., is operating its local shipbuilding works at full capacity, and is said to have orders on hand to keep the plant busy for the next 12 months. It recently completed a new steel barge for the Lehigh Valley Railroad, making the sixth for this road.

The De Lion Tire & Rubber Company, East State Street, Trenton, N. J., is having plans prepared for a second story addition to its plant, 50 x 112 ft., to cost about \$10,000, and for a new reinforced-concrete extension, 20 x 60 ft., to cost \$7,000.

The Belmont Motor Corporation, recently incorporated in Delaware, has acquired the former North American Tannery building at Lewiston, Pa., and plans the establishment of a new motor truck plant, to specialize in initial operations in assembling work. C. G. Gochanaur, Harrisburg, is one of the promoters.

The Reading Knob Works, Oakbrook, Reading, Pa., is hav-

ing plans prepared for a one-story addition to its foundry, 50 x 50 ft.

The Potts Mfg. Company, 200 West Allen Street, Mechanicsburg, Pa., manufacturer of iron and steel products, has acquired the former machine shop and business of the George B. Comstock Estate, at North Market and Allen streets, as an extension in operations. It will be used for the manufacture of its former specialties, including ornamental iron, fire escapes, iron fences, etc. Jesse L. V. Smith is president and general manager.

The Steel Plate Products Company, Pottstown, Pa., has filed articles of incorporation with a capital of \$50,000. The company has perfected plans for the immediate erection of a plant in the West End section. S. Rea Morris is treasurer.

## Chicago

CHICAGO, ILL., May 8, 1917.

Demand continues active, while deliveries, if changed at all, are a little tighter, especially for milling machines and radial drills, although standard tools of all kinds are difficult to procure inside of six or eight months. Second-hand tools are scarce, and move quickly when offered, provided the price is at all reasonable, which is sometimes not the case, as with the offering of a large group of tools by a Detroit company. The representatives of several Chicago dealers found that prices had been fixed at a high level by the receiver of the company in question. About 75 tools, valued at over \$100,000, were offered, but only a few were purchased. Few buyers were on hand.

Lathes of the newer makes are plentiful and easier to obtain than any other kind of machine. Dealers are considerably annoyed by the frequency with which intending buyers assert they need machines for Government purposes, and one seller proposes asking these buyers for affidavits to back up their assertions.

The Rock Island Arsenal is likely to be a big buyer in the near future. It is understood that present plans contemplate assembling plants for shells.

The Wagner Electric Mfg. Company, St. Louis, which is understood to have figured or to be figuring on a Government contract, has made inquiry for a large list of tools, including turret lathes and automatic screw machines.

Deere & Co., Moline, Ill., have been making tentative inquiry for tools required in its tractor department, and is expected to buy a large number in the near future.

The Santa Fe list is still pending, but the railroad business in general is quiet. Scattered inquiries, on most of which the best possible deliveries are eagerly sought, are numerous.

The Illinois Malleable Iron Company, Chicago, is planning the erection of a foundry addition, 154 x 325 ft., to cost \$40,000.

Plans are being drawn for a three-story factory, 75 x 175 ft., at Wabash Avenue and Thirty-sixth Street, Chicago, for the Staver Motor Car Company, to cost \$70,000. Harry B. Staver is president. The company's present plant has been acquired by the Studebaker Corporation.

The Charles L. Elmes Engineering Works, 232 North Morgan Street, Chicago, is having plans drawn for a four-story factory, 50 x 125 ft., to cost about \$40,000.

Arthur Foster, architect, 230 South La Salle Street, Chicago, will take bids May 10 for two factories to be erected at West Forty-eighth Street and Campbell Avenue. One will be one-story, 40 ft. high, 75 x 150, of mill construction, and equipped with a traveling crane; the other will be three stories.

The William D. Gibson Company, manufacturer of steel springs, 1802 to 1830 Clybourn Avenue, Chicago, has let contracts for a two-story factory, 60 x 220 ft., and alterations to the present plant, representing a total expenditure of \$150,000.

E. J. Patelski, architect, 4431 West Madison Street, Chicago, has prepared plans for an additional story to a one-story factory, 74 x 240 ft., at Argo, Ill., for the Elgin Motor Corporation, to cost about \$40,000. Fred L. Brown, president, is receiving bids.

The Acme Boiler & Tank Company, South Chicago, Ill., has awarded the contract for a shop, 50 x 80 ft., to cost about \$6,000.

An automobile plant, to cost \$65,000, will be built at Decatur, Ill., by the American Motors Company.

The Comet Automobile Company is erecting a plant at Decatur, Ill., to cost \$75,000. The company moved from Rockford, Ill.

Work has been begun at Decatur, Ill., on a plant to cost \$50,000 for the Williams Sealing Company, manufacturer of metal tops for fruit jars, which will move there from Waterbury, Conn.



The A. J. Stephens Rubber Company, formerly the McFall Rubber & Mfg. Company, has removed to 1320 Chestnut Avenue, Kansas City, Mo., from its former plant at Seventeenth Street and Woodland Avenue, which was damaged April 12 by fire with a loss of about \$40,000. It will establish improved facilities for the manufacture of automobile tire accessories.

The Sioux City Casket Company, Sioux City, Iowa, has purchased a site and will erect a new factory in the near future. Definite plans have not been completed.

## Detroit

DETROIT, MICH., May 7, 1917.

More activity was noted in the machine-tool market the past week, with a large number of inquiries coming from scattered sources. Deliveries on milling machines have become more difficult, many companies refusing to supply them. Grinding machines and lathes require 90 days. Manufacturing conditions continue good. Automobile companies report they are from 30 to 60 days behind in orders, with parts hard to obtain. Building operations have slowed up appreciably, due to the scarcity of materials.

The General Motors Company is preparing to manufacture a farm tractor in Detroit. William C. Durant, head of the company, is in Detroit arranging for the manufacture of a tractor to cost about \$1,500.

The Kesler Motor Company, Detroit, capitalized at \$500,000, has been organized to manufacture aeroplane motors. The factory site has been purchased, but for the first few months the parts will be made in machine shops and assembled at the plant, owing to the difficulty in obtaining machinery. M. C. Kesler is president and H. C. Brooks, Jr., treasurer.

The Olympian Motors Company, Pontiac, Mich., will construct a new assembling building, 1 story, 300 x 800 ft. Work will begin as soon as the labor and material situation becomes favorable. R. A. Palmer is president.

The Detroit Tire Carrier Company, Detroit, has purchased the Van Guard Company's plant, which it will increase in size 50 per cent. A. H. Goss is president and William D. Mercur, secretary and treasurer.

The Western Carburetor Company, Charles City, Iowa, will remove to Alma, Mich., and will shortly begin the manufacture of kerosene carburetors.

Work on the first of the buildings to house the Wolverine Tractor Company has been started at Inkster, Mich. The building at present under construction is temporary. Manufacturing of tractors on an extensive scale will start this spring.

The manufacturer of the Kerston-Gas-Electric car will begin in Detroit shortly. Harry Kerston, formerly designing engineer of the Studebaker Corporation, is now associated with J. William Barnes in the formation of the new company which has opened offices at 910 Kresge Building, Detroit.

The Kelly Furniture Company, Grand Rapids, Mich., will move to Sheridan, Mich., where a new manufacturing building will be erected.

The Plymouth Motor Castings Company, Plymouth, Mich., will shortly begin the construction of the second half of its foundry, 50 x 420 ft.

The Belding Foundry Company, Belding, Mich., has been incorporated with a capital stock of \$25,000, and will take over the company of the same name, formerly owned by R. A. Stokoe. Mr. Stokoe is secretary of the new company, which will enlarge its plant and install new equipment.

The United Motortruck Company, Grand Rapids, Mich., is having plans drawn for an addition to its plant, 75 x 300 ft., which will be used for the manufacture of a tractor and trailer. The company now employs 150 men and it is expected that this force will be doubled.

The Hayes Wheel Company, Jackson, Mich., has let contract for the erection of a one-story factory, 50 x 235 ft., as an addition to its hub plant in Albion, Mich.

The Sheffield Car Company, Three Rivers, Mich., has let the contract for a brick and steel addition to its foundry, 325 x 378 ft.

The Hoover Steel Ball Company, Ann Arbor, Mich., will erect three new buildings and equip them to increase its production from 25,000,000 to 40,000,000 balls per day. The expansion of the company undertaken this year will amount to \$250,000. The buildings will be of brick and concrete, and the new construction will give the company a total increase within the past three years of 800 per cent in capacity. L. J. Hoover is vice-president and general manager.

The Wilmarth & Morman Company, manufacturer of

grinding machinery, Grand Rapids, Mich., started construction May 1 of an addition, 74 x 86 ft., two stories. H. P. Dix is secretary.

## Milwaukee

MILWAUKEE, WIS., May 7, 1917.

Machine-tool requirements are gradually widening as the national war program becomes more definitely defined. Companies with Government orders are predominant in the list of buyers. Preference in deliveries is given to such purchasers. Buyers who are unable to prove their affiliation with strictly war supply orders are obliged to wait. This situation has not reduced the rather feverish demand of late for a tool-at-a-time from users who are obliged to increase facilities or make much needed replacements of worn-out equipment. The shortage of both skilled and unskilled labor is still a serious matter, especially in the foundry trade. On May 1 many voluntary wage increases were made throughout the metal-working industry in this district.

The Wisconsin Duplex Auto Company, Clintonville, Wis., has been organized with a capital of \$500,000 to manufacture motor vehicles. More than one-half of the capital has been subscribed and arrangements will be made at once for the establishment of a plant, which will be equipped to manufacture a one-ton commercial car and later a pleasure car. A small experimental shop has been maintained at Clintonville. The following officers have been elected: President and chief engineer, W. A. Besserdich; vice-president, A. S. Larson, Shawano, Wis.; secretary and general manager, B. A. Mosling, Clintonville; treasurer, J. P. Mosling, directors, J. H. Frank and the officers.

The Richardson-Phenix Company, 122-128 Reservoir Avenue, Milwaukee, maker of lubricating devices, has awarded a contract to the Dahlman Construction Company, for the erection of a one-story reinforced concrete, brick and steel shop addition, 100 x 140 ft., costing about \$25,000. John W. Peterson is manager.

The Standard Oil Company, Germania Building, Milwaukee, has plans for a garage and repair-shop, 90 x 140 ft., two stories and basement, at Walker and Barclay streets, to cost, with equipment, about \$27,000. A steam power plant with a 70-ft. stack is included in the specifications. W. W. Nichols is manager.

The Wald Mfg. Company, Sheboygan, Wis., has plans for a one-story shop addition, 60 x 100 ft. It manufactures motor car, motorcycle and bicycle parts and accessories.

Wausau, Wis., has engaged W. G. Kirchhoffer, consulting engineer, to prepare plans and estimates on an aerating filtration unit for the municipal waterworks system to cost about \$100,000.

The Valley Iron Works, Appleton, Wis., is building an addition to its foundry, 20 x 100 ft.

The Marsh Refrigerator Service Company, Milwaukee, formerly the Milwaukee Refrigerator Transit & Car Company, is erecting a one-story shop and office addition, 45 x 200 ft.

The Aerial Cutlery Company, Marinette, Wis., maker of fine cutlery, has increased its capital stock from \$35,000 to \$100,000 to accommodate the rapid growth of its business.

The Silent Washer Company, Appleton, Wis., has been reorganized and will remove to Clintonville, Wis., as soon as suitable factory quarters are built or secured. The officers are: President, John L. Zehren; vice-president, M. B. Lendved; secretary-treasurer, Robert Fischer; general manager, G. W. Buttles; directors, John Kalmes, E. E. Buttles and the officers.

Brown & Richards, River Falls, Wis., hardware dealers, are contemplating the establishment of a factory for the manufacture of steel ladders, wardrobe hooks, sash lifts and other hardware specialties. The business probably will be incorporated with \$15,000 capital.

The Western Malleables Company, Beaver Dam, Wis., is making a number of improvements and alterations to gain larger capacity without new construction at this time. The corerom of shop No. 3 is being rebuilt into a two-story pattern shop, heretofore occupying a part of the Center Street foundry. Two truck ovens and two drawer ovens will be installed in shop No. 3. The company is experiencing a shortage of skilled and unskilled labor, and from 200 to 300 additional men could be used if available. Ernest E. Smythe is general manager.

The J. J. Dougherty Company, 803 Grand Avenue, Milwaukee, will spend \$25,000 in the erection and equipment of a two-story garage and repair-shop, 60 x 127 ft., on Milwaukee Street, near Juneau Avenue.

The Highway Trailer Company, Edgerton, Wis., started operations in its new plant May 7. The following officers were elected: President and general manager, James W. Menhall, Beloit, Wis.; vice-president, M. J. Johnson, Madi-

son; secretary, E. Z. Menhall, Beloit; treasurer, Andrew McIntosh, Edgerton; assistant secretary and treasurer, C. A. Florey, Beloit; directors, B. C. Willson, Frank Pringle and the officers. Mr. Johnson is comptroller of the Gisholt Machine Company, Madison.

## Cleveland

CLEVELAND, OHIO, May 7, 1917.

The machinery market has been more quiet the past week than for some time, due to uncertainty among manufacturers as to future conditions because of the war, and especially to the fear that plant operations will be interfered with by taking men from the shops for service in the army. It is not dull, however, as the demand for single tools and small lots of machines is holding up well. At present the supply of labor is short of the demand and manufacturers do not want to add new machinery and then be unable to find men to operate it. The most important local development the past week was the resumption of work in the building trades, which had been entirely tied up for about two months by a strike and lockout. Many new manufacturing plants and shop additions which owners desired to rush to early completion were involved and this suspension of work has doubtless had some effect on the machinery market, although much of the equipment needed for the plants was purchased before the tie-up occurred.

The Cleveland Metalcraft Company, Cleveland, maker of metal furniture, lockers, tool racks, etc., has increased its capital stock from \$25,000 to \$100,000 to provide for its growing business. An extension to its plant has just been completed and some machinery will be installed shortly.

The American Steel Valve Company, Cleveland, has been incorporated with a capital stock of \$60,000 by A. S. Cuthbert, H. H. Pratt and others.

The Horsburgh Forge Company, Cleveland, has increased its capital stock from \$50,000 to \$100,000.

The Perfection Trolley Company, Cleveland, has been incorporated with a capital stock of \$10,000 by R. W. Winbush, J. W. Brown and others.

The Wadsworth Foundry Company, Wadsworth, Ohio, has commenced the erection of a gray iron jobbing foundry, 60 x 80 ft., which it expects to place in operation in June. It has a capital stock of \$15,000. C. C. Paterson is president and general manager.

The Canton Rim Company, Canton, Ohio, has been incorporated with a capital stock of \$100,000 and will establish a plant to manufacture automobile rims and automobile specialties. A. R. Turnbull and others are interested.

The Acme Power Company, Toledo, Ohio, has an inquiry out for a number of machine tools for a machine shop.

Plans for a new factory building for the Toledo Scale Company, Toledo, have been prepared by Mills, Rhines, Belman & Norderh, Ohio Building, Toledo.

The Fostoria Pressed Steel Company, Fostoria, Ohio, has been incorporated with a capital stock of \$100,000 by W. C. Allen, C. D. Pifer and others.

## Indianapolis

INDIANAPOLIS, IND., May 7, 1917.

The Indianapolis Coaster Company, Indianapolis, has been incorporated with \$13,000 capital stock to manufacture amusement devices. The incorporators are George Christena, Harry A. Fenton and John S. Brady.

The Studebaker Corporation, South Bend, Ind., will build a machine shop, to cost \$200,000, at Kendall and Sample streets.

The Henley Roller Skate Company, Richmond, Ind., has been reorganized and incorporated with \$30,000 capital stock to manufacture roller skates. The directors are M. C. Henley, John H. Williams, P. W. Smith, P. A. Reid and Willard Z. Carr.

The Reid Mfg. Company, Indianapolis, has been incorporated with \$50,000 capital stock to manufacture special castings and machinery. The directors are C. W. Reid, J. K. Reid and W. A. Braden.

The George L. Wiser Specialty Mfg. Company, Evansville, Ind., has been incorporated with \$30,000 capital stock to manufacture equipment for playgrounds. The directors are George L. Wiser, N. O. Harvey, Grover R. Williams, John E. White and E. B. Atkinson.

The Battery Service Company, Lafayette, Ind., has increased its capital stock from \$5,000 to \$50,000.

The Star Truck Mfg. Company, Indianapolis, has been incorporated with \$5,000 capital stock to manufacture motor power trucks. The directors are Edward L., M. E. and L. Hauck.

The plant of the DeTamble Motor Company, Anderson, Ind., has been sold to James W. Sansberry, of the National Exchange Bank, for \$15,000.

The Modern Appliance Company, Rushville, Ind., has been incorporated with \$75,000 capital stock to manufacture office appliances. The directors are Erling Falk, J. Vincent and A. D. Brewer.

The Hammond Malleable Iron Company, Hammond, Ind., H. J. Wanner, president, has let contract for an addition, 70 x 280 ft., to its molding shop. A 25-ton furnace and additional ovens will be installed. The company is also building a shipping room, 100 x 160 ft., and a new office building.

The Revere Motor Car Company, Logansport, Ind., has begun the erection of a manufacturing building to cost \$50,000. Medland Brothers, Logansport, have the contract.

## Cincinnati

CINCINNATI, OHIO, May 7, 1917.

The city building commissioner's report, for the month of April, 1917, shows 1280 permits issued for improvements, valued at \$1,039,780. This is \$116,385 less than for April, 1916; but considering the high cost of building material and labor it is considered a remarkable showing. A comparative large percentage of improvements under way is for manufacturing buildings.

Outside reports have been circulated that a number of Cincinnati manufacturers had received Government contracts for munitions. These reports are not correct, but it is generally known that several firms in Dayton, Ohio, have lately been awarded some of this business and that other contracts are pending.

Demand from the steel mills and shipbuilding firms for machine tools is steadily increasing. The call for wood-working equipment is also very brisk, although only a limited percentage of the inquiries received lately have as yet developed into actual orders.

In central Ohio, particularly around Columbus, quite a number of large manufacturers are installing gas producer plants.

The Cincinnati Frog & Switch Company, Oakley, Cincinnati, is making an addition to its plant that will be under cover within the next few days. Very little new equipment will be required.

The American Oil Pump & Tank Company, whose Cincinnati sales office is at Kindel Street and Central Avenue, has decided to operate a branch plant in Cincinnati, for which it has leased a three-story manufacturing building on Findley Street.

The Fosdick Machine Tool Company, Cincinnati, has taken out a permit for a one-story brick and steel addition, 50 x 135 ft., of sawtooth roof construction. N. B. Chace is general manager.

The Ault & Wiborg Company, Cincinnati, has let contract to the Ferro Concrete Construction Company, Cincinnati, for a fireproof addition to its plant in Norwood, 117 x 150 ft., three stories.

The National Lead Company, Cincinnati, has let contract for an addition to its plant on Seventh Street, 75 x 80 ft., two stories. Part of the building will be used for storage purposes and the second floor as a restaurant and rest room for employees.

The John Douglas Company, Cincinnati, manufacturer of plumbing goods, will soon have plans prepared for another addition to its plant in Carthage. The company is just now moving into an office building recently completed.

The Duriron Castings Company, Dayton, Ohio, has taken out permit for an addition to its plant for storage purposes estimated to cost \$7,000.

The Standard Register Company, Dayton, Ohio, has had plans prepared by Schenck & Williams, architects, Dayton, for a fireproof one-story factory of approximately 25,000 sq. ft. floor surface. Its present plant is in the Callahan Power Building, and the new plant will enable it to more than double its capacity.

It is reported that the Dayton Rubber Mfg. Company, Dayton, Ohio, has completed plans for going ahead in the construction of its proposed new plant.

The Rike Folding Box Company, Dayton, Ohio, contemplates making an addition to its plant.

It is rumored that the Platt Iron Works Company, Dayton, Ohio, has recently been awarded a large Government contract for finishing 6-lb. shells.

The Columbus Climax Rubber Company, Columbus, Ohio, with offices in the Citizens' Building, has been organized to erect a factory for manufacturing automobile tires. Part of the machinery has already been ordered.

The Standard Novelty Company, Columbus, Ohio, is con-

sidering making an addition to its plant on North Third Street.

The Superior Die, Tool & Machine Company, Columbus, Ohio, is contemplating increasing the capacity of its plant. Details are not yet available.

The Jaeger Machine Company, Columbus, Ohio, advises that its new plant, recently mentioned, will have  $3\frac{1}{2}$  acres under roof and when in full operation will enable it to practically double its present output of concrete mixers.

The Favorite Stove & Range Company, Piqua, Ohio, will go ahead on its plans for erecting a new factory building.

The Swayne-Robinson Company, Richmond, Ind., will erect an addition to its plant, one story, 60 x 180 ft., of brick. The new addition will be used for foundry purposes.

The Oberlin Motor Truck Company, Lancaster, Ohio, has purchased a factory with 68,000 sq. ft. of floor space and a site of 10 acres served by both the Hocking Valley and Pennsylvania railroads. Reports that the plant had been leased are incorrect. W. M. Oberlin is president.

## The Central South

LOUISVILLE, Ky., May 7, 1917.

A tendency to continued postponement of orders for later delivery is noted by some of the local houses. Two of the largest building projects scheduled for the summer in Louisville have been postponed indefinitely, largely on account of conditions in the structural steel market. Coal and oil development work is going forward on an increasing scale and numbers of small electric light and power plants are being installed. Motors are in big demand in view of the advancing prices of coal, charged to car and labor shortages. An actual shortage in farm implements is reported, the situation being further aggravated by very slow deliveries. Prices on these lines have advanced about 10 per cent since Jan. 1 and an additional  $2\frac{1}{2}$  per cent is now due.

The National Safety Can Company, Louisville, Ky., has been incorporated with a capital stock of \$100,000 by C. D. Tylor, C. B. Joseph and J. L. Miller of Louisville and C. H. Halt and J. L. Sawin of Indianapolis, Ind.

The American Oak Leather Company, Louisville, Ky., will erect and equip a two-story addition to its plant at an estimated cost of \$11,000.

The McJunkin Machine Company, Lesterville, W. Va., has leased a factory in Winchester, Ky., as a nucleus for a machine shop of considerable importance, to handle oil-drilling equipment.

The Adairville Lighting Company, Adairville, Ky., has been incorporated with a capital stock of \$12,000 by R. B. Brian, R. W. Russell and J. E. Russell.

Dealers' prices on a 300-kw., 2300-volt, three-phase, 60-cycle generator and 200-hp. motor, three-phase, 60-cycle transformer are asked by the Southern Machinery Exchange, Somerset, Ky.

Bustin Brothers, Lancaster, Ky., have purchased the electric light and power plant there of Alex Walker, and are reported to be contemplating improvements to provide a 24-hr. service.

The Wilson-Biggs Lumber Company, Ashland, Ky., has been incorporated with capital stock of \$25,000 by Robert E. L. Wilson, William A. Biggs and S. S. Willis.

The Allen-Eaton Panel Company, Memphis, Tenn., has been incorporated with a capital stock of \$125,000 by W. H. Matthews, J. W. Eaton, C. B. Allen and Robert H. Stickely to manufacture panels and built-up wood products.

The Metamel Products Company, Memphis, Tenn., has been incorporated with a capital stock of \$50,000 by Tillman Cavert, A. L. Whitfield, Val Taylor, Houston W. Fall and Paul W. Hoggins to manufacture roofing.

The Oliver Tractor Company, Knoxville, Tenn., has been incorporated with a capital stock of \$10,000 by William J. Oliver, E. C. Hammond, J. E. Campbell, Carl F. Nilson and D. G. Madden to manufacture tractors and other farm implements.

The Hart Mfg. Company, Grand Rapids, Mich., will remove its manufacturing plant to Knoxville and has applied for a Tennessee charter authorizing a capital stock of \$60,000. The incorporators are D. A. Isely, E. R. Taylor, H. M. Taylor and others. The company manufactures heating and ventilating systems, sanitary drinking fountains and other sheet-metal and brass products.

Arlington, Tenn., is selling \$15,000 of bonds and will install a municipal water and light plant to use oil burning engines. W. A. Taylor is mayor.

H. I. Douglass, Morristown, Tenn., is asking for prices on a used rotary veneer machine for cutting stock for egg cases, etc.

## Birmingham

BIRMINGHAM, ALA., May 7, 1917.

While caution appears visible here and there, the large trades, such as lumbering and mining, are so active that wholesale machinery dealers continue to find it rather difficult to meet demands.

The Barrett Shipbuilding Company, Mobile, Ala., has been incorporated by George S. Leatherbury, J. T. Schley, W. R. Quinn and others with a capital stock of \$13,000.

The Marine Transport Company, Mobile, has been incorporated by Peyton Norville, W. J. Norville and others with a nominal capital stock of \$3,000 to manufacture submarine chasers and other vessels.

The Gill Machine Company, Birmingham, has been incorporated by J. J. Kyser, J. M. Kyser, O. H. Bowen and others with a capital stock of \$15,000.

The Silicrete Refractories Company, Irondale, Birmingham, Ala., has been incorporated with a capital stock of \$30,000 by R. R. Zell, J. H. Waters, J. E. Cosgrove and others to manufacture fire brick.

The International Castings Company, Rome, Ga., has been incorporated with a capital stock of \$10,000 by W. A. Smith, E. W. Kreider and others to manufacture ranges, stoves and hollowware.

## St. Louis

ST. LOUIS, Mo., May 7, 1917.

The machine-tool demand continues rather slow, compared with 60 days ago, but a considerable aggregate is coming from industries which need equipment for replacement, extensions, etc.

The L. D. Meyer Ice & Fuel Company, St. Louis, has been incorporated with a capital stock of \$50,000 by L. D. Walter F. and Victor L. Meyer and George Grafe to manufacture artificial ice.

The St. Louis Battery Company, St. Louis, has been incorporated by August Mangold, Barton R. Ford and Roy J. Ward and will purchase about \$2,000 worth of storage battery manufacturing equipment.

The Black Gold Oil & Gas Company, Kansas City, Mo., has been organized by Frank Seely, J. F. Neff and J. H. Sills and will install about \$15,000 worth of oil-refining equipment.

The Western Chair Company, St. Louis, has been incorporated by Arthur Franke, Edwin Lochmoeller and H. O. Sachritz and will install about \$8,000 of wood-working equipment.

The Safety Sub-Cushion Tire Company, Springfield, Mo., has been incorporated with a capital stock of \$15,000 by C. E. Robinson, G. W. Young and G. W. Sanford to manufacture automobile tires.

The Higginsville Lumber Company, Kansas City, Mo., has been organized by C. E. Renfro, M. C. Nelson and George R. Byrnes and will equip a planing mill at Higginsville, Mo., requiring about \$15,000 worth of machinery.

The Concrete Steel Fireproofing Company, Kansas City, Mo., has been incorporated with a capital stock of \$65,000 by Edward C. Marqua, Franklin R. Hopper, Kansas City, and William J. Morse to manufacture construction material.

The Egyptian Burial Vault Company, Chillicothe, Mo., has been organized by C. E. Campbell, William L. Cox and E. H. Brackey to manufacture burial vaults. About \$10,000 will be expended for equipment.

The Trusswall Mfg. Company, Kansas City, Mo., will double the capacity of its plant for the manufacture of concrete columns, etc.

Smithville, Mo., will erect a new electric light plant to replace the one destroyed by fire. About \$7,500 worth of machinery will be purchased. Harry Gordon is manager.

The American Machinery Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of \$50,000 by John T. Fitzpatrick, Peter Martin and G. S. McLanahan to manufacture mechanical equipment.

The Southwestern Railway Supply Company, Springfield, Mo., has been incorporated with a capital stock of \$150,000 by J. P. Koff, J. W. Sherman and K. W. Roberts to manufacture railway supplies and equipment.

The Black Steel & Wire Company, 413 Bryant Building, Kansas City, has been organized with a capital of \$600,000 to manufacture wire and wire rope. Harry W. Black is president.

The Gustin-Bacon Mfg. Company, Kansas City, manufacturer of mill supplies and railroad equipment, has increased its capital by \$70,000 to extend its plant capacity.

The J. M. Hays Wood Products Company, Jefferson City,



Mo., has been organized by James M. Hays, Paul S. Hallenberger and Walter Hampton to manufacture saddle trees.

The Conway Cotton Oil & Gin Company, Conway, Ark., will equip a gin, requiring six 80-saw gin stands and a double revolving press.

The Cochran-Foster Lumber Company, Argenta, Ark., has increased its capital and will install about \$15,000 worth of new machinery.

The Arkansas Cooperage Company, Brinkley, Ark., has been incorporated with a capital stock of \$50,000 by J. M. Myers, R. J. Goeppinger and W. F. Cleveland.

The Absorption Gasoline Company, Tulsa, Okla., has been incorporated with a capital stock of \$250,000 by J. C. Gillespie, J. A. B. Landell and H. O. Bland and will equip a gasoline producing plant.

The Miller-King Lumber Company, Vinita, Okla., H. C. Miller and others interested, is in the market for about \$15,000 worth of equipment.

The Drummond Elevator Company, Drummond, Okla., Ira J. Long and others interested, will install about \$10,000 worth of mechanical equipment.

The Dixie Engineering Company, Enid, Okla., has been incorporated with a capital stock of \$210,000 by L. E. Cornu, F. C. Shackle and M. P. Funk and is in the market for equipment.

Tulsa, Okla., has completed plans for improvements to its waterworks plant to cost about \$675,000. John H. Simmons is mayor. Stevens & Stiles, Kansas City, Mo., are engineers in charge.

The Terrebonne Oil & Gas Company, Houma, La., W. B. McCormick, president, will equip a pipe line, including pumping stations from Terrebonne to New Orleans, Morgan City, La., and other points to cost about \$18,000 per mile.

The Powell Lumber Company, Lake Charles, La., will equip a sawmill at Sulphur, La., with a daily capacity of 50,000 ft.

The Pritchard-Wheeler Lumber Company, Bank of Commerce Building, Memphis, Tenn., has been incorporated with a capital of \$300,000 to equip plants near Wisner, La. William Pritchard, C. L. Wheeler and others are interested.

The Nutro Rice Mill Company, Gueydan, La., has been organized by Henry L. Gueydan, J. R. Riley and R. M. Montague and will install about \$40,000 worth of rice mill equipment.

The cooperage plant of the Louisiana Cooperage Company, Plaquemine, La., has been burned with a loss of \$40,000.

## Texas

AUSTIN, TEX., May 5, 1917.

General building activities show improvement as is indicated by the increase in the number of permits granted in the larger cities. Plans are on foot for constructing several ship yards at Texas gulf ports. The machinery trade in Mexico shows a material improvement.

Armour & Co., Chicago, will construct a new cold storage plant at San Antonio to cost about \$100,000.

The Tarver Shipbuilding Corporation, Beaumont, incorporated with a capital stock of \$150,000, will construct shipyards to build wooden ships. Ed Paggi, Beaumont, is a stockholder.

The Odesa Light & Power Company, Odesa, incorporated with a capital stock of \$4,000, will build an electric light and power plant. The incorporators are R. M. Henderson, W. F. Bates and W. H. Rhoades.

The Texas Chemical Company, Houston, has awarded the contract to Horton & Horton, Houston, for the construction of the first unit of a series of chemical plants, to be located upon the ship channel near Houston, to manufacture fertilizers and by-products. The initial unit will cost \$51,000.

The City Council, Houston, has awarded the contract to Charles S. Basham for the construction of a new waterworks pumping station on the south side to cost \$18,970.

The Lufkin Veneer Company, Lufkin, has been incorporated with a capital stock of \$25,000. W. D. Weds is a stockholder.

The American Producing & Refining Company has purchased the old oil refinery of the Houston Oil Company, near Houston Heights, and will move it to a point on the ship channel, where it will be rebuilt and enlarged to bring its capacity to about 5000 bbl. of oil per day.

John H. Kirby, Houston, president of the Kirby Lumber Company, is organizing a corporation to construct and operate a shipyard at Beaumont. It plans to build six schooners with auxiliary power, each costing about \$150,000, as soon as the shipways and necessary shops are erected.

## San Francisco

SAN FRANCISCO, CAL., May 4, 1917.

The machine-tool trade for the past two weeks has been quite active in this immediate section, although southern California reports slower business as a result of national conditions. Shipping and transportation companies have been the heaviest buyers, with general shop and garage work about up to standard. Advances on the small tool lines have failed to halt the demand. An especially good call for wood-working machinery is expected this summer.

The Terminal Shipbuilding Company, San Francisco, has taken a ten-year lease on 62 acres at Vallejo, Cal., and will begin the erection of ways for four vessels at once. The company has a capital stock of \$1,000,000. R. T. Stone, E. Ustick, A. H. Coates, W. J. Conroy and R. F. Covert form its board of directors.

The Tractor Motors Company, San Francisco, has been authorized by the State Commissioner of Corporations to issue 145 shares to A. N. Lewis in exchange for an invention and \$7,000 cash.

The Falketina Ship Company, San Francisco, has been incorporated with a capital stock of \$275,000 by Nathan H. Frank, Hans Sandborg and Irving H. Frank. Of the capital \$225,000 has already been subscribed and a plant will be erected shortly somewhere on San Francisco Bay.

The Hammond Lumber Company, the Pacific Lumber Company and the Charles Nelson Company, all of San Francisco, have purchased a tract of land adjoining the Hammond Company's mill at Eureka, Cal. They will erect a shipbuilding plant and an electrically operated sawmill. Four sets of ways are to be put in.

The planing mill of the E. C. Sessions Company, Oakland, Cal., which was destroyed recently by fire, will be rebuilt shortly, according to the owner's announcement. The plant covered a city block.

The Santa Fé Railroad is installing a planing mill at its Richmond, Cal., shops for the preparation of lumber used in manufacturing and repairing cars.

The Sloat Lumber Company, Quincy, Cal., has been incorporated with a capital stock of \$200,000 by F. S. Murphy, Paul F. Keyser, H. A. Turner, N. A. Turner and Henry M. Feiss. The company will erect a saw and planing mill.

The Douglas Fir Exploitation & Export Company, an organization of the larger mills and wholesale dealers on the Pacific coast, has authorized its manager, A. A. Baxter, to arrange with the Government for the construction of as many wooden ships on this coast as he thinks can be handled. Mr. Baxter left for Washington last week.

The Western Pipe & Steel Works, San Francisco, is to add three new units to its shop equipment. This will increase the number of workmen to 300.

The Pacific Automatic Lock Company, Fresno, Cal., has been incorporated with a capital stock of \$50,000 by Robert E. L. Good, D. C. Sample, William Shaw, Frank P. Short, Dan Brown, Jr., John W. Short and William G. Cochrane. A factory to manufacture a patented window lock will be established.

The board of education, Oakland, Cal., has voted to increase the foundry and electrical shop equipment of the technical high school.

The Pacific Gas & Electric Company, San Francisco, will spend \$70,000 on additional gas manufacturing machinery at its Fresno, Cal., plant. R. J. Lyon will be in charge.

David M. Ward has purchased the Western Boiler & Steel Company, Los Angeles, Cal.

The Commercial Electrolytic Corporation of California, Los Angeles, has been incorporated with a capital stock of \$100,000 by F. E. Stevens, J. McWilliams, Jr., R. T. Laughlin, J. R. Mason and F. F. Wehrle.

The Craig Shipbuilding Company, Long Beach, Cal., is to erect a frame machine shop on channel No. 3.

Fire at Los Angeles, Cal., destroyed the works of the R. W. Sparling Engine Company, the Pacific Copper & Brass Works and the Hartmann plant. The loss is estimated at \$45,000.

The Eisenhuth Motor Company, Los Angeles, will establish a factory for the manufacture of automobiles. It will cost \$10,000,000 when completed.

The Los Angeles Shipbuilding & Dry Dock Company, Los Angeles, has leased 70 acres of tideland from the city, and Samuel Naphaly, the manager, will leave for the East to place orders for machinery and steel. The company has been incorporated with a capital of \$1,500,000 by Albert Crutcher, S. M. Haskins, James A. Gibson, Jr., Martin Forrest and Edward E. Bacon, all of Los Angeles.

The first unit of the proposed shipbuilding plant of John F. Craig, Long Beach, Cal., comprising the machinery build-

is rapidly nearing completion. The construction of ship hulls has been commenced, and plans for the building of two steel vessels, each to cost about \$400,000, are being perfected.

The Savage Tire Company, San Diego, Cal., has awarded a contract for the erection of a one-story extension to its plant, 40 x 80 ft., to cost about \$5,000.

The Mexican Magnesite Company, recently organized by C. E. Shaffer, San Francisco, Cal., is negotiating for property near San Diego for the erection of a refining plant for magnesite and connecting works for the manufacture of bath fixtures and kindred specialties from the refined product.

The Santiago Orange Growers' Association, Orange, Cal., has voted an appropriation of \$100,000 for the erection of an icing and precooling plant for Eastern shipment. The proposed plant will include ice-manufacturing department, refrigerating plant, pressure blower system, ice-conveying apparatus and other equipment.

Joseph C. Griffin, 932 Winfield Street, Los Angeles, has filed plans for a new brick foundry, 50 x 60 ft., at 749-51 East Fifteenth Street.

## The Pacific Northwest

SEATTLE, WASH., May 1, 1917.

Figures for the first quarter of 1917 show that Seattle's water-borne domestic and foreign commerce has increased more than 32 per cent over a similar period of 1916. Figures for 1917 show \$102,809,284, with \$77,566,379 for first quarter of 1916.

In a period of less than a year 40 new shipbuilding plants have been organized in the State of Washington, with an aggregate capital stock of more than \$17,000,000. The boom in shipbuilding started about one year ago. In October and November, 1916, more than half of the companies were incorporated, followed by a slight lull. In February, after international troubles approached a crisis and the call for wooden ships went out, the activity began again. The capital stock of the companies ranges from \$5,000,000 for the largest to \$10,000 for the smallest.

Several Seattle shipbuilding firms have been offered a contract for construction of a 3600-ton dead-weight cargo capacity wooden ship, but in all cases the offer was refused. Portland and Columbia River companies also refused to build the vessel. The uncertainty of the building situation until the Federal Shipping Board makes known its plans is given as the reason for the lack of interest in new work. Many private contracts are at this time available, but builders are awaiting Government action.

The lumber industry continues to be seriously crippled throughout the Northwest, and particularly in Oregon, by the car shortage. Many plants who have orders booked for months ahead are practically closed down on account of the extreme scarcity of cars. In eastern Oregon lumbermen have established a car service bureau of their own, to prevent what they term discrimination by the carriers. Many plants report orders unfilled for six months' time.

The Standard Shipbuilding Company, Vancouver, Wash., recently incorporated by W. C. McPherson, A. H. Devers, L. O. Elrod and Lloyd Bates, all of Portland, plans the immediate erection of a shipbuilding plant in Vancouver to construct wooden ships.

Livingston, Mont., has voted a bond issue of \$225,000 to be used in construction of a municipal water plant.

The Lummi Bay Packing Company, Ltd., of Canada, Bellingham, Wash., plans the construction of a two-line cannery at Nitinat, on the west coast of Vancouver Island, to cost about \$100,000.

The Skandia Engineering Company, Seattle, has recently closed contracts with a local shipbuilding company for furnishing four 350-hp. fuel oil engines, costing approximately \$100,000. The engines will be built at the Oakland, Cal., factory of the Skandia Engine Company.

The Ward & Burkheimer Shipbuilding Company, Seattle, has been incorporated for \$100,000 by Dean Burkheimer and Eugene Ward, and will construct a wooden shipbuilding plant in Olympia, Wash. Both incorporators are officials of the Olympia Shipbuilding Company.

Halladay Brothers, Glasgow, Mont., plan to immediately open a large machine works which it is now constructing.

The Coast Pump & Machinery Company, L. C. Smith Building, Seattle, has been organized by H. H. Lewis and will represent several well-known lines of air compressors, power pumps, condensers and waterworks equipment.

Harry & Cunningham, engineers, Spalding Building, Portland, are completing plans for draining 4400 acres of land for the Wahkiakum Drainage District No. 2, near Cathlamet, Wash., to cost \$150,000. The plans provide for the installation of a number of pumping plants.

The Pacific Coast Storage Company, Seattle, has been in-

corporated by F. D. Campbell, general foreman of the car shops at Tacoma of the Chicago, Milwaukee & Puget Sound Railway Company, and associates, for the construction of a plant for the manufacture of five refrigerator cars per day.

The Alaska Engineering Commission, Bell Street Dock, Seattle, according to H. P. Warren, engineering representative, plans to institute barge service between Seattle and Anchorage, Alaska, which will handle more than \$500,000 worth of railway supplies. The Columbia Barge Company has the contract for moving the supplies.

The Pacific American Fisheries Company, Bellingham, Wash., according to E. B. Deming, president, will start work at once to enlarge its shipbuilding yards at Commercial Point, to make room for the construction of five vessels. The ships will be used in its Alaska cannery fleet.

The Sound Paper Company, Seattle, Wash., recently incorporated at Olympia, with a capital of \$5,000,000, plans the immediate development of the Sultan River power project, and the establishment of a paper mill in or near Seattle that will utilize 400,000 ft. of timber per day. H. O. Pond, New York, Scott Calhoun, attorney, of Seattle, and S. P. Weston of Seattle are the incorporators. The ultimate development of the power project and paper mill is placed at \$12,000,000.

The plant of the Portland Stove Works, Portland, Ore., after occupying its site in Portland for 30 years, is being moved to its new location at Kenton. A two-story brick building has been constructed, and the foundry department is being enlarged.

The Alaska Pacific Navigation Company, Seattle, plans the immediate construction of two 3500-ton wooden vessels, each vessel to have two engines of 500 hp. each.

The Great Falls Iron Works, Great Falls, Mont., plans to construct a brick structural shop, 70 x 75 ft., to be equipped with new machinery. The improvement will cost \$15,000.

Word has been received in Seattle that the Stone & Webster traction interests, represented in Seattle by the Puget Sound Traction, Light & Power Company, have offered to build a number of wooden ships for the Government, the vessels to be constructed at plants to be located on Puget Sound. A. W. Leonard, president of the local system, states that plants would probably be located at Bellingham and Tacoma. Vessels costing approximately \$300,000 each would be built.

R. W. Hill, Hoge Building, Seattle, Wash., has been elected secretary and treasurer of the South Bend Shipbuilding Company of Seattle.

## Canada

TORONTO, ONT., May 7, 1917.

C. L. Perkins, Ltd., Ottawa, Ont., has been incorporated with a capital stock of \$45,000 by James P. McMullen, Matthew J. Armstrong and others to carry on the business of machinists, mechanical engineers, iron founders, etc.

The Burlington Steel Company, Ltd., Hamilton, Ont., has increased its capital stock from \$400,000 to \$650,000 by the creation of 2500 shares at \$100 per share.

Preliminary plans for the enlargement of the Union Cement Company's plant at Owen Sound, Ont., will involve an expenditure of \$275,000. The plans call for four new buildings. The main feature of the plant will be two rotary kilns, each 170 ft. in length by 9 ft. in diameter. It is reported that building operations will be commenced within a month and are to be completed and the plant ready for operation by next spring. The Fuller Engineering Company, Allentown, Pa., is the contractor.

The Gilson Mfg. Company, Guelph, Ont., manufacturer of gasoline engines, stationary engines, machinery, castings, etc., is erecting an addition.

A. Coates & Sons, Burlington, Ont., are in the market for a nailing machine.

Moore & Stephens, Chatham, Ont., have been awarded contract for an addition to the factory of the Dowsley Spring & Axle Company, Chatham, to cost \$5,000.

The Canadian Leonard Construction Company, Barrie Building, Peterboro, Ont., has been awarded the contract for rebuilding the Quaker Oats Company's plant at Peterboro, recently destroyed by fire. The new plant will cost \$500,000.

The Quebec Harbor Commissioners, Quebec, have awarded contracts for a grain storage building to cost \$275,000.

Bids will be received by the electrical engineer of the electric department of the City Council, Winnipeg, Man., until May 15 for an addition to the municipal power plant to cost \$180,000. C. J. Brown is city clerk.

The Tilsonburg Foundry & Machine Company, Ltd., Tilsonburg, Ont., proposes to establish a plant and is asking the town for a loan of \$10,000. Equipment for a machine shop will be purchased.

The Farmers' Co-operative Company, Calgary, Alberta,

plans to erect 10 elevators throughout the Province of Alberta, having a total capacity of 6,000,000 bu.

The Fir Tree Lumber Company, Fraser Valley, B. C., will build an electric sawmill at Dennison Road, B. C., estimated to cost \$60,000.

Farand & Delorme, Ltd., 59 St. Martin Street, Montreal, manufacturer of steam boilers, flumes, smoke stacks, etc., will build an addition to its plant at a cost of \$7,500.

James B. Watson, Kincardine, Ont., is promoting a company which will erect a plant there at a cost of \$25,000 for the manufacture of reed fiber furniture, etc.

The Thames Quarry Company, St. Mary's, Ont., whose plant was recently destroyed by fire with a loss of \$20,000, will commence at once on the erection of a new plant. Complete new machinery will be required. J. W. Graham is manager.

The Military Hospital Commission, 1 Queens Park, Toronto, will erect a factory for the manufacture of artificial limbs, etc.

The Welland Shipbuilding Company, Ltd., St. Catharines, Ont., has been incorporated with a capital stock of \$200,000 by Francis H. Keefer, Donald Munro, Frederick C. Piper and others.

The Canadian Fairbanks-Morse Company, Ltd., 84 St. Antoine Street, Montreal, has had its powers extended so as to include the manufacture of automobiles, supplies, iron and steel bridge-making material, engines, electrical apparatus, air and steam compressors, locomotives, pumping machinery, tools, etc.

J. & P. Davignon, Ltd., Montreal, has been incorporated with a capital stock of \$45,000 by Joseph and Pierre Davignon, Joseph A. Lacasse and others to manufacture electrical machinery, etc.

The Valleyfield Tool Mfg. Company, Ltd., Valleyfield, Que., has been incorporated with a capital stock of \$100,000 by James M. Garant, Charles G. Ogden, John L. Reay and others, all of Montreal.

The plant of the Phoenix Iron Works, Vancouver, B. C., was gutted by fire recently.

A movement is on foot in New Westminster, B. C., to amalgamate the various local shipbuilders and equip a large shipyard for the construction of wooden vessels for the Imperial Munitions Board. Mayor Gray of New Westminster and David Whiteside, M.P.P., are at the head of the project.

J. T. Johnston is in charge of the erection and equipment of the plant to be built for the National Abrasive Company, Boston, manufacturer of carboron, at Hamilton. Purchases will be made through the Ritchley Supply Company, 126 Wellington Street West, Toronto.

The Rideau Steamboat Company, Ltd., Ottawa, has been incorporated with a capital stock of \$50,000 by William E. Beaton, William J. Best, Albert W. Campsall and others to construct boats, steamers, drydocks, elevators, etc.

Fire totally destroyed the stone crusher building of the Bonis Thames Quarry at St. Mary's, Ont., with a loss of \$10,000. The machinery was badly damaged.

The Bungalow Brick Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Jacob H. Greenberg, 24 King Street West; Walter G. Hammond, room 11, 24 King Street West; Marie O'Brien, and others, to manufacture brick, concrete blocks, tile, etc.

The Canadian Automatic Churn Company, Ltd., Winnipeg, has been incorporated with a capital stock of \$100,000 by John R. Haney, Sidney B. Clifford, James H. Evans, Deputy Minister of Agriculture, and others, to manufacture farm implements, machinery, etc.

Smelters, Ltd., Montreal, has been incorporated with a capital stock of \$45,000 by Peter Bercovitch, Ernest Lafontaine, Nathan Gordon and others, to manufacture and refine babbitt, solder, lead, zinc, machinery, etc.

The F. X. Truck & Auto Company of Canada, Ltd., Walkerville, Ont., has been incorporated with a capital stock of \$45,000, by Stephen A. Griggs, Edwin H. Collins, Elihu C. Griggs and others, to manufacture motor trucks, motors, engines, parts and accessories.

The International Equipment Company, Ltd., Montreal, has been incorporated with a capital stock of \$250,000 by Arnold Wainwright, Aubrey H. Elder, D. Burley-Smith and others to manufacture railway, mining, foundry and marine supplies, car wheels, trucks, cars, etc.

The Boat Releasing Gear of Canada, Ltd., Montreal, has been incorporated with a capital stock of \$226,000 by Arthur R. Holden, Pierre A. Badeaux, Arthur Charters and others, to manufacture gear, tackle, parts, accessories, for boats, etc.

The Consolidated Company, Trail, B. C., plans to immediately reconstruct its concentrator destroyed by fire several weeks ago. The main building of the new plant will be 50 x 100 ft.

## Government Purchases

WASHINGTON, D. C., May 7, 1917.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until May 15, schedule 1050, for two Diesel engine-driven generating sets for Norfolk; schedule 1057, for one 32-in. horizontal boring, drilling and milling precision machine for Boston; schedule 1058, for 8 two-speed portable breast drills, 8 portable electric drills and 8 portable, double emery grinding machines, all for Bridgeport, Conn.; until date not set, schedule 1060, for one 48-in. x 48-in. x 36-ft. planing machine, and schedule 1061, for one No. 2 wire feed screw machine, two No. 1 wire feed screw machines with tube and finger feed, 9 Nos. 00, 0 and 2, 1 1/4-in. x 1 1/2-in. turret, 3/8-in. new model automatic screw machines, two high-duty drilling machines, two polishing and finishing machines and four bench lathes, all for Washington; schedule 1083, for one radial drilling machine for Mare Island; schedule 1091 for two motor-driven plate and spacing tables with punches for Philadelphia and Norfolk; schedule 1092, for one 300-ton high-speed forging press for Norfolk.

The following bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, May 1, schedule 971, steam engineering, class 141, for two turret lathes for Charleston: Kemp Machinery Company, \$2,344 and \$2,580; Warner & Swasey Company, \$3,267; Jones & Lamson Machine Company, \$1,100, part, and \$1,505, part.

The general purchasing agent of the Alaska Engineering Commission, Seattle, Wash., will receive sealed bids until May 14, under circular 281, for one steam hammer, one combination pipe and bolt threading machine, one electric blower, one set drill and reamer holders, one lathe chuck, one universal chuck, etc.

The chief of the Bureau of Yards and Docks, Navy Department, Washington, will receive sealed proposals until 11 a. m., May 21, under specification 2379, for furnishing and installing 500-kw. and 750-kw. turbo generators and 2500-kw., 3125-kw., 3750-kw. and 4375-kw. turbo generators for alternating current for the various navy yards, under specification 2380, for steam turbine-driven turbo and engine-driven reciprocating air compressors of from 2500 to 8000 cu. ft. per min. capacity; under specification 2374, until 11 a. m., May 28, for furnishing four 15-ton traveling, revolving hammer-head shipbuilding cranes for the Puget Sound Navy Yard.

The following bids were received April 6 by the commanding officer, Rock Island Arsenal, Ill., under schedule 1296, for furnishing one universal milling machine:

The Garvin Machine Company, New York City, \$1,910 f.o.b. New York.

Hill, Clarke & Co., Chicago, Ill., No. 1 1/2-B Kearney & Trecker, with countershaft, \$1,960; No. 2-B, \$2,155.

The E. L. Essley Machinery Company, Chicago, Ill., Kemp-smith No. 3, with slotting attachment, \$1,900.

The Federal Machinery Sales Company, Chicago, Ill., \$1,950.

The Stocker, Rumley, Wachs Company, Chicago, Ill., Rockford No. 2-C, \$1,575.

The Dale Brewster Machinery Company, Chicago, Ill., Cleveland No. 3, \$2,425 f.o.b. Cleveland, Ohio.

The Brown & Sharpe Mfg. Company, Providence, R. I., \$2,315.

The Niles-Bement-Pond Company, New York City, \$2,725.

The Marshall & Huschart Machinery Company, Chicago, Ill., Cincinnati No. 3, \$2,230.

The following bids have been received by the commanding officer, Frankford Arsenal, under proposal 467, April 17, for furnishing one multiple-spindle boring machine:

The J. A. Fay & Egan Company, Baltimore, Md., \$1,349, with five extension slides instead of nine, 1200 r.p.m., delivery 10 days, accepted; alternate bids, \$1,431.50 and \$1,320 with 1800 r.p.m.

DeHuff & Hopkins, Philadelphia, Pa., \$1,560 each, delivery 50 days; alternate bids, \$980, Andrews Multiple-Spindle Machine, \$900 each, delivery at once.

The Hyatt Roller Bearing Company, Newark, N. J., announces that, due to advances in the costs of the raw materials that enter into the manufacture of Hyatt roller bearings, ranging from 10 to 50 per cent, and the higher wage rates prevailing, it has found it necessary to make advances in its prices, effective May 15.

The Jackson Fire Brick Company, Jackson, Tenn., announces that it has purchased the Hunt Pressed Brick Company, successor to Southern Tile & Brick Works at Jackson. The property bought includes a firebrick plant and the Jaxon brands of firebrick.



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THE building of an industry in Greenwood, a city a large machine as a brass and an iron men. Boat building the simplest kind of machine their own construction.

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Geo Brown  
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W Allen  
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Geo L  
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J Harlow  
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W Harlow  
A Harlow  
H Harlow  
Geo Harlow

Some Well-Known Names  
Stephoe & Co., Cincinnati